



FRIDAY, DECEMBER 27, 1901.

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## New Yards and Shops of the Central Railroad of New Jersey at Elizabethport, N. J.

[WITH AN INSET.]

In earlier issues we have referred to the building of a new shop and yard plant on the Central Railroad of New Jersey at Elizabethport, N. J. This work is now nearing completion and we give on an inset and elsewhere in this issue part of the illustrations and description

which it so well merits. The rest of the matter will be published in a later issue. An interesting feature is that the buildings are almost entirely of monolithic concrete construction but, while this is the largest single grouping of concrete buildings yet assembled, the mere fact of using concrete becomes but a detail when the entire scope of the work is understood. To give an idea of what had to be provided for in this plant we here rehearse briefly some of the most important governing traffic conditions that control operations in and near the Jersey City terminal.

There is a heavy commutation traffic on the Newark Branch of the Central Railroad of New Jersey, on the main line east of Somerville, and also on the New York & Long Branch Division. There is also the New Jersey Southern Division work coming in over the New York & Long Branch, as well as the freight and passenger business from the manufactories along Staten Island Sound. Other very important parts of the traffic are, coal coming across the State from Pennsylvania; a heavy local freight business; and the heavy passenger and freight business of the Philadelphia & Reading. The point where all this traffic meets is Elizabethport, and the railroad from Elizabethport to Jersey City is practically one great yard.

Roundhouse facilities must be provided for the various classes of locomotives required by this complex service, near the terminal at Jersey City, but traffic requirements prohibit giving any very large space to repair shops between Elizabethport and Jersey City. It is probable also that the development of the territory between Elizabeth and Jersey City, and south of Elizabeth along Staten Island Sound, will make it necessary to sort incoming freight at some point near Elizabethport, and to make up the westbound trains at the same place. The traffic arrangements bring all classes of locomotives past such a point. Finally, the topographical conditions are such as to fix the choice of location on Elizabethport as giving sufficient area upon which to build the shops.

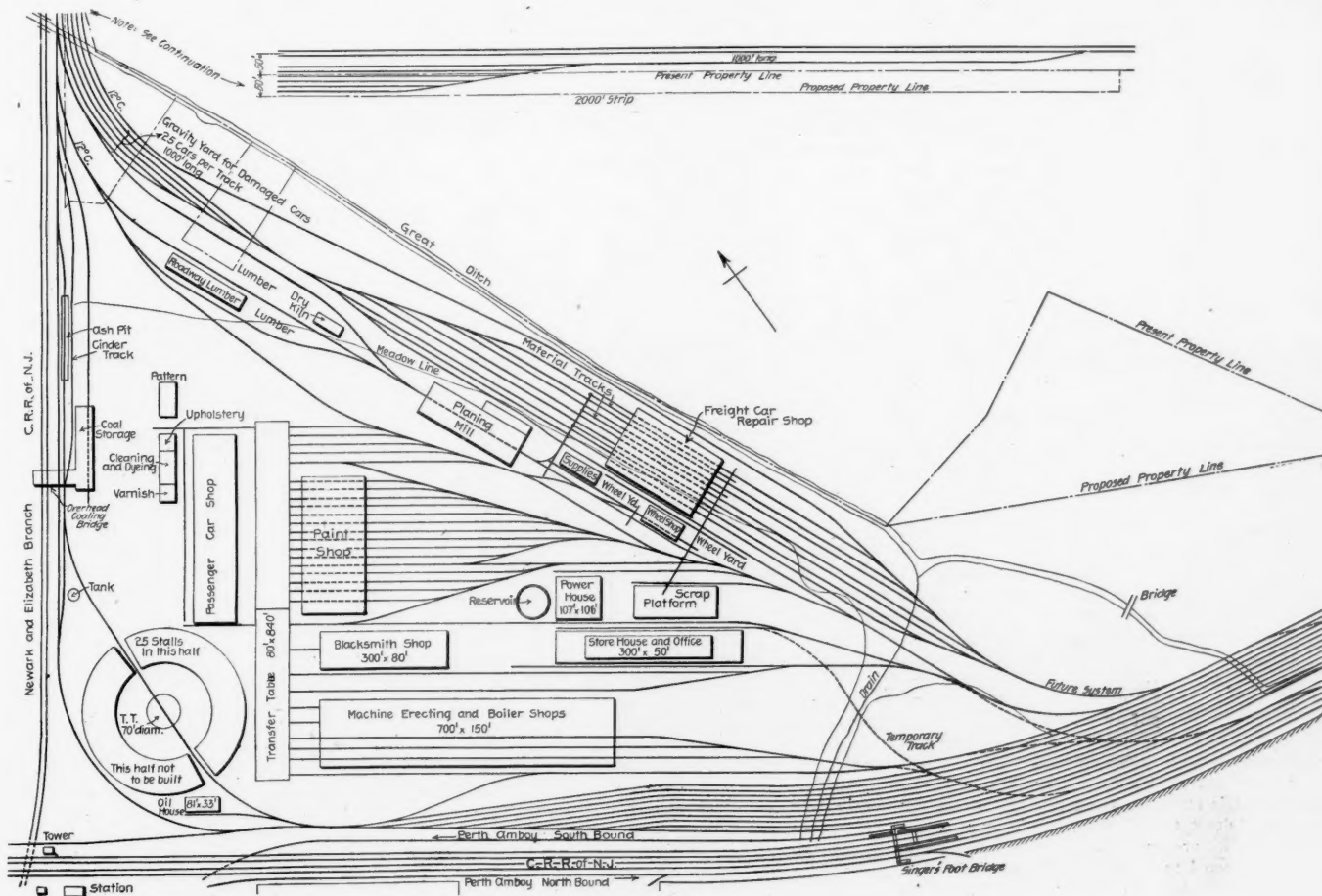
The Central Railroad of New Jersey has for a number of years maintained a repair shop in a restricted area near the water front, the capacity of which is totally inadequate to their needs. There are also shops near the west end of the line, at Ashley, Pa., which are in general properly located for taking care of engines and cars used in the coal traffic from the near-by fields. The new shops are northeast of the Elizabethport Station, opposite the Singer Manufacturing Co.'s works, between the Newark Branch Railroad and Newark Bay, and north of the main line of the Central Railroad of New Jersey. Part of the site is in meadow and part of it on upland, the upland portion being triangular in form. The complete lay-out of the yards and buildings is shown by one of the illustrations, one of the interesting features being a gravity yard northwest of the shop site, where damaged cars are received and eventually run down to the freight car repair shops.

In laying out the plant it was planned to get a movement of engines and cars through the shops in a direction parallel with that of the main line; to so place each shop

building that it could be entered from both ends; to so arrange that each shop building could be increased 100 per cent. in size without changing the layout; and to make the layout in each shop such that each department should be distinct and deliver its product as nearly as possible at the point where it is to be used in final assemblage. How well this has been done will at once appear from the illustration to which we have just referred. In applying these conditions to the details of the work it was necessary to use the transfer table, the size of which is shown in the general layout as 80 x 840 ft., including the width of the table. This decreases the longitudinal travel which, in shops of smaller capacity, can be provided for by cross-over switches. To have used cross-over switches with the aggregate lengths of track which this plant requires would have made it necessary to separate the buildings about 2,000 ft. The shops are intended to have a capacity for repairing 450 locomotives, 8,000 miscellaneous freight cars and 8,000 coal cars in heavy repairs, and 500 passenger cars, yearly. The transfer table therefore became a necessity in the layout of this plant and the wisdom of its use is apparent.

The 52-stall roundhouse, one-half of which has been built and the location of which is shown in the general layout, was put where it is shown after a careful study of the traffic conditions. It was borne in mind that engines in working order should be housed where the engine movement required would be a minimum and would not interfere with the movement of engines or cars coming in for repairs. The roundhouse has a 70-ft. turn-table and is well-equipped along lines of best modern practice, as will appear later in the description. The storehouse and the power house are at what will be the center of the completed plant when it is extended to its ultimate capacity. There is so much of interest to be said about the details of this plant that we shall ask our readers to refer to the illustrations for the size of buildings, as their relative values are there apparent from figures or in relative proportion. Inter-communication is shown by the track lay-out, and a special form of electric motor car for handling the lighter articles is used. This is a special design by Mr. George Hill and we are not at liberty to show it now. This electric truck system reaches every part of all shops and requires no tracks. The transference of materials within the building will be by overhead cranes and trolleys, all but two of which are of relatively small capacity.

**Concrete.**—The concrete used in this work was in some cases made with an aggregate of engine cinders, in general with the proportion of one part of cement, three of Edison sand and six of cinders. Gravel aggregate was also used, composed of gravel as it came from the bank, mixed with sand and unscreened. About 1 per cent. was in cobblestones 2 in. in diam. and over, the balance all sizes of gravel and sand to the smallest. When this was employed it was mixed with cement only, the amount of cement used being determined by experiment. In all cases the concrete was mixed very wet so that no ramming was required. After being deposited it was puddled with a light wooden rammer to secure an even dis-



General Layout of Yards and Shops at Elizabethport, N. J.—Central Railroad of New Jersey.

NOTE.—Tracks are Shown by Center Lines.

tribution. No attention was paid to the weather, concrete being mixed and deposited in any weather in which the men would work.

When the temperature dropped below 25 deg. all water used was brought nearly to the boiling point and salted, using 1 lb. of salt for 18 gals. of water. When the work stopped at night it was covered with canvas between the forms and sprinkled with salt. The forms for the work below ground were of rough hemlock; above ground, of yellow pine painted with soft soap, which gave a smooth surface. No provision was made for expansion and contraction from temperature changes with cinder concrete. This is good practice, but in gravel concrete a joint should be made about once in 150 ft. Some of the concrete was mixed by hand, some of it in mixing machines. Wherever the walls were less than 18 in. thick it was found that hand mixing was more economical, the labor cost for mixing and depositing the concrete being frequently as low as 50 cents per cu. yd. Where the machines were used the cost for mixing was reduced, but the cost for handling and depositing was so much increased as to overbalance it. In general it may be said for building work that no machine mixer is economical that can not be transported as easily as a wheelbarrow.

**Construction of Buildings; Foundations.**—The clay sub-soil was in all cases adequate when dry, to support a load of three tons per square foot, but it was of course practically impossible to keep it dry, especially as the season was a very wet one. In anticipation of this difficulty and of a difference in the compressibility of the clay when wet, the loads were limited to one ton per square foot, which was found to be as much as was safe, as the sub-soil proved to be of considerable compressibility when wet, varying in amount in different locations. To decrease as much as possible the effect of local soft spots the foundations were in general put in as walls, with footing of moderate width, distributing the concentrated loads from the columns over a considerable length of wall. Where the footing material is incompressible or good, the best practice is probably to use isolated square footings, but where the ground is noticeably compressible this is objectionable.

**Powerhouse.**—The powerhouse is an independent building divided into engine room, boiler room and coal bunkers, as shown in the illustrations. The engine room is of two stories with the engines on the first floor and all piping, feed-water heaters, air tanks, pumps and similar apparatus in the basement. There will be three 100-k.w. direct-current, 240-volt direct-connected sets of generators, each having its own panel on the switchboard, with voltmeter, ammeter and recording watt-meter. Spaces will be left for three more units of the same size. This may seem a small electrical equipment for a plant of this size, but experience at the new plant on the Wyoming Division of the Erie Railroad at Dunmore (a suburb of Scranton, Pa.) has shown this to be sufficient for the present need of the Central Railroad of New Jersey plant.

The Dunmore plant to which we refer has worked about 50 per cent. economy over previous operations at that point, and we take pleasure in saying that a complete description of that plant will presently be published in the journal of the American Society of Civil Engineers, when written by Mr. George Hill, who designed and built the plant.

The Central of New Jersey powerhouse is of concrete construction throughout, the walls being 12 in. thick in the basement and 4 in. thick above. The basement floor is of concrete 12 in. thick laid directly on the ground, with a depressed central portion for the pumps. The first floor is of concrete and metal, 12 in. thick, supported on concrete piers, which are so placed as to be in general under the engines and air compressors, which rest directly on this floor. The roof is of concrete 6 in. thick, supported on cast-iron columns as illustrated. All piping of the powerhouse is in the basement, being supported on pipe stands on the basement floor. All electrical conductors are on the ceiling of the basement, so that the first floor is entirely free and clear.

The switchboard is arranged in panels, there being three generator panels and the lighting and power distribution panels. This switchboard has circuit-breakers for all switches carrying 200 amperes or more. Switches carrying less than 200 amperes are provided with no-arc fuses. The board has Mr. Hill's own design of switches, circuit breakers and bus-bar work, there being nothing in the electrical circuit except rolled copper, on which the current density is limited to 750 amperes per sq. in. Where joints are necessary the copper is cleaned and the parts are bolted together and the current density is limited to 40 amperes per sq. in. Where cables enter lugs, the lugs are of special design, to retain the same high electrical efficiency. Each generator has a Thomson recording watt-meter, so its output can be determined. The piping is so laid out that special mains can be employed for the compressors, the pumps and engines, and the coal per hour of work determined for each use.

The boiler room is made with concrete side walls and roof. The forced-draft tunnel is made of concrete, the boilers are of the water-tube type, and the breeching is of sheet iron connected to a 25-ft. stack, which is sufficient to raise steam when the boilers are cold, and to operate, without forced draft, all the lighting of the plant, the cranes and the transfer table. The automatic shaking grates used make it unnecessary to clean the fires. The estimated coal consumption was such as to

make it expensive to use automatic stokers. Judging from the performance of a similar, but smaller plant, not more than 1½ tons of coal per hour will be required in the most severe weather.

There are two air compressors, each having a capacity of 1,000 cu. ft. of free air per minute. In the boiler room are two batteries of boilers, each of 500 h.p., operating on the closed ash-pit system, the air being delivered from fans through underground ducts and specially designed bridge walls into the ash pits. The boilers are fitted with shaking grates and burn rice coal. The coal bins are directly in front of the boilers. A single system of conveyors removes the ashes from in front of the fire and discharges them into the ash car, and also elevates the coal from a bin underneath the track into the bunkers. The system is operated by electric motors, and is so divided that it can be used for either purpose without conflict. The stack is of sheet iron 25 ft. high, 5 ft. in diam.

**Power Distribution.**—Power is distributed by electric current through tunnels running beneath all of the buildings, and connecting them with the power plant, the tunnels being in general 4 ft. wide and 6 ft. high. Special sets of mains are provided for lighting, for operating the motors in connection with the heating system, and for the operation of the machine tools in each of the buildings. Compressed air is also conveyed through the tunnels to all of the buildings. Large storage tanks are used in the powerhouse, and equalizing tanks 4 ft. in diam. and 12 ft. long at various points in the buildings, not more than 200 ft. apart, to equalize pressures, act as reservoirs and permit the use of pipes of moderate size. High-pressure steam is carried through all of the tunnels to supplement the exhaust steam in the heating stacks, to supply steam for testing locomotives, for the operation of steam hammers, and for any other purpose which may subsequently develop. Exhaust steam is led through the tunnels to the heating stacks to utilize the waste heat in the exhaust in the heating of the buildings, and the water of condensation is returned to the boilers by gravity.

**Machine, Erecting and Boiler Shop.**—These shops are contained under practically one roof, the erecting shop section having a clear span of 70 ft., with 35 ft. under the crane hook. The machine tools are contained in two bays, each of 35 ft. span, north of the erecting shop floor. The exterior walls are of concrete to a point 7 ft. above the floor, at which point heavy cast-iron shoes are imbedded for the column seats. Above this point the walls are of brick 12 in. thick to the crane runway girders and 8 in. thick above, entirely surrounding the column. The crane runway girders, columns, and roof trusses are of standard structural steel, the crane girders being designed as continuous girders, and the connections between the top flanges being so made as to develop the full strength of the section. The roof trusses are made nearly flat with a monitor in the central portion, the entire top of the monitor and one-half the area of the two sides being filled with translucent fabric, and the balance being planked with 3-in. yellow pine covered with the ordinary gravel roofing. The roofs of the machine bays are similarly treated. This gives an exceptional amount of light. All of the side walls and the roof are painted white, and the structural steel below the bottom chord of the truss is painted red.

The flooring is made by first filling with 12 in. of cinders, then 6 in. of lean concrete, on which 4-in. x 4-in. sleepers are laid 2 ft. on centers. The space between the sleepers is filled with lean concrete and the flooring is of 3-in. x 3-in. dressed yellow pine. The electrical conductors for the operation of the various motors are carried in conduits underneath the floor, the panel boards controlling the circuits being placed above the floor on the posts. The engine pits, arranged as illustrated, each have a number of electrical outlets for portable lights, and the center pit has compressed air outlets as well. Just outside of the west end of the machine shop two cleaning vats will be placed. When an engine enters the shop to be stripped, the lighter parts will all be put in a basket 4 ft. x 1 ft. 6 in. deep and 14 ft. long, made of structural steel and wire netting. This basket is provided with hooks so that it can be elevated by the crane, placed on a special truck at the end of the building, carried to the lye vats, where the parts are thoroughly cleaned, placed in a dry basket properly labeled and then stacked in the machine shop wherever they will be out of the way. In this way all of the parts of the engines are kept together, transported as a unit from place to place, and finally delivered alongside of the engine for assembly.

The machine tools are grouped in departments as shown on the drawings, each of which is arranged so that the heavier tools shall be under two small cranes, and the lighter tools where they can be reached by air lifts and the automobile truck. Each department as a whole is so arranged that the piece to be machined passes from tool to tool through the department, traveling first north and then south, so that it leaves the department near the place at which it entered, with the least possible amount of travel and where it can be delivered by the crane to the place of assembly.

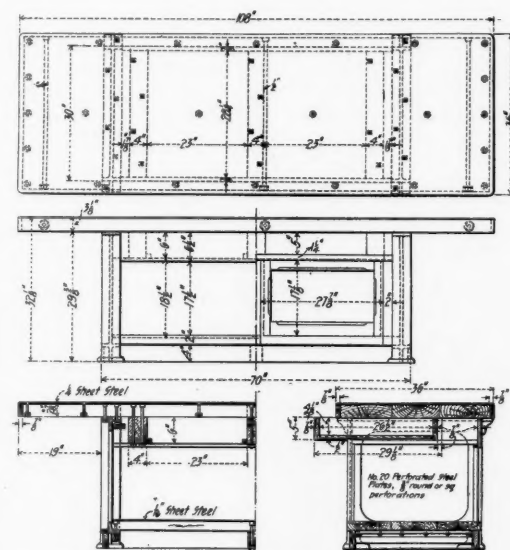
Nearly all of the tools are motor-driven, some of them by motors attached to the frame of the tool, the others by a motor-driven countershaft. With the exception of small drills which are intended to be used as floating tools, being taken to the work by the crane, any tool requiring

three or more horse-power to operate it is provided with its own motor. Tools requiring less power to operate are arranged in groups. The tool room is practically in the center of the shop, and the racks for the storage of tools are all given designating numbers. All tools are made and sharpened in the tool room. A pneumatic system is provided whereby any machine-tool operator can obtain a sharp tool in place of the dull one by writing the number of his machine-tool and the number of the tool which he requires (obtained from a blue-print attached to the machine tool) on a slip of paper which is pneumatically transmitted to the tool room. A messenger takes the sharp tool to him, bringing the dull tool back as his receipt. Special appliances are obtained in a similar manner. The tool room is in connection with the storehouse by means of a pneumatic tube and telephone.

In the boiler shop oil furnaces are used to heat plates. Compressed air is used in all of the riveters, the largest being of 16-ft. gap, with a capacity for driving 1¼-in. rivets. This riveter has an electric crane of 40 tons capacity for its exclusive use, which is operated by the riveter foreman, who stands on a platform supported by the stake of the riveter, controlling the crane with his right hand and the riveter with his left. Locomotives and tanks are handled in the erecting shop by means of two 50-ton cranes which have an auxiliary 5-ton hoist each, so that when not employed in handling engines they can be used continually for the transportation of articles through the shops.

The two 50-ton electric cranes in the erecting shop, acting in conjunction, can carry a locomotive anywhere through the shop. This is considered an advantage over using one 100-ton crane, and is a result of using the longitudinal system of transfer. Where the transverse system is used a 100-ton crane, which usually stands idle about 85 per cent. of the time, is necessary and requires structural accompaniments twice as strong as for the longitudinal system. With that there must be supplemental cranes, runways and girders for the lighter, regular work. In the longitudinal system the one pair of cranes is in use practically all the time and serves every purpose. The two 50-ton cranes run on one track over the erecting floor, and one 10-ton and one 5-ton crane runs over the track in the machine shop bay which contains the heavy tools.

The tracks of the erecting shop are so placed as to accommodate five lines of engines, three rows on tracks and two rows on trestles in between. Heavy vise benches are used as shown by the detail drawing. It is unnecessary to bolt them to the floor, and they can be taken from place to place by cranes. This vise bench was originally designed in the motive power department of the Lehigh



The Barker Vise-Bench—C. R. R. of N. J. Shops.

Valley railroad, and is now made and sold by S. G. Barker & Son, Scranton, Pa. Lockers of expanded metal are provided for the workmen. These are in groups with metal backs and are set throughout the shops so as to be convenient and well ventilated. The windows in this shop are made very large and of the designer's special factory pattern, the entire sash revolving and giving an effective opening equal to the size of the sash.

**Blacksmith Shop.**—In construction it is similar to the machine shop, with concrete side walls 4 in. thick, plank roof, monitor and large skylight. Down-draft forges are used. The equipment of steam hammers and other tools is given in the list of tools. Tools not operated by steam are operated by electric motors.

**Transfer Table.**—The transfer table is 80 ft. wide and has a run of 800 ft. at the rate of 300 ft. per minute. The runways are placed 11 ft. apart on centers and are continuous concrete walls with broad footings, the walls being 18 in. thick, the footings 18 in. thick and 5 ft. wide, with metal imbedded in the bottom. The outside walls are made particularly heavy to withstand the shock of the engines moving over the joint between the transfer table and the fixed rails. The table itself is of heavy structural steel framing, and is operated by means of two continuous-current motors with series parallel control.



The same motors are used to operate the hauling device. The wheels are flanged but ground absolutely cylindrical. Following is the list of tools and motors:

#### Motor and Tool List.

Note: Machine tools 1 to 99 from other C. R. R. shops. Machine tools 100 and above, new tools.

- No. 1—72-in. Driving wheel tire lathe, 5 h. p.
- No. 2—Ashley Co. wheel lathe.
- No. 3—Pond Co. car wheel tire lathe.
- No. 4—Miles Co. wheel tire lathe, 5 h. p.
- No. 5—Single head axle, wheel, 2 h. p.
- No. 6—Double head axle, wheel, 5 h. p.
- No. 7—36-in. x 16-ft. Engine lathe, 4 h. p.
- No. 8—33-in. x 18-ft. lathe, 3 h. p.
- No. 9—30-in. x 14-ft. lathe, XII A.
- No. 10—30-in. x 12-ft. lathe, 3 h. p.
- No. 11—24-in. x 16-ft. lathe, 3 h. p.
- No. 12—18-in. x 8-ft. lathe, G. V.
- No. 13—18-in. x 8-ft. lathe, G. VII A.
- No. 14—18-in. x 8-ft. lathe, G. VI.
- No. 15—18-in. x 8-ft. lathe, 1 h. p.
- No. 16—16-in. x 6-ft. lathe, G. VII A.
- No. 17—16-in. x 6-ft. lathe, G. VII A.
- No. 18—14-in. x 5-ft. Tool room lathe, G. VI.
- No. 19—36-in. x 16-ft. lathe, G. XII A.
- No. 20—28-in. x 12-ft. lathe, 2 h. p.
- No. 21—20-in. x 10-ft. lathe, G. VII B.
- No. 22—25-in. x 14-ft. lathe, G. XII A.
- No. 23—22-in. x 8-ft. lathe, G. VII A.
- No. 24—20-in. x 8-ft. lathe, G. VII A.
- No. 25—16-in. x 8-ft. lathe, G. VII B.
- No. 26—24-in. x 12-ft. lathe, G. VIII.
- No. 27—12-in. x 5-ft. Universal speed lathe, G. VIII.
- No. 28—16-in. x 4-ft. Fairbanks lathe, G. VII A.
- No. 29—No. 3 Monitor brass lathe, G. VIII.
- No. 30—No. 3 Monitor brass lathe, G. VIII.
- No. 31—16-in. x 6-ft. Monitor brass lathe, G. VIII.
- No. 32—Universal lathe, G. VII A.
- No. 33—No. 2 lathe, G. VII B.
- No. 34—60-in. x 60-in. x 25-ft. Pond Planer, 15 h. p.
- No. 35—36-in. x 36-in. x 10-ft. Pond Planer, 5 h. p.
- No. 36—24-in. x 24-in. x 6-ft. Pond Planer, 5 h. p.
- No. 37—24-in. x 24-in. x 8-ft. Planer, 5 h. p.
- No. 38—48-in. x 54-in. x 14-ft. Planer, 7½ h. p.
- No. 39—24-in. x 24-in. x 8-ft. Planer.
- No. 40—24-in. Crank planer, 3 h. p.
- No. 41—No. 3 Bickford radial drill.
- No. 42—48-in. Radial drill.
- No. 43—42-in. Radial drill.
- No. 44—49-in. Upright drill, G. V.
- No. 45—36-in. Upright radial drill.
- No. 46—36-in. Upright radial drill, G. IV.
- No. 47—13-in. Friction drill, G. VI.
- No. 48—4-ft. Spindle cotter drill, G. V.
- No. 49—48-in. Drill press, G. XII B.
- No. 50—48-in. Drill press, G. XII B.
- No. 51—80-in. Boring mill, 5 h. p.
- No. 52—39-in. Boring mill, 5 h. p.
- No. 53—39-in. Boring mill, 5 h. p.
- No. 54—42-in. Car wheel boring spacing mhl.
- No. 55—36-in. Old style car wheel boring mach., 5 h. p.
- No. 56—Locomotive cylinder-boring machine, G. IV.
- No. 57—14-in. Slotter, 4 h. p.
- No. 58—8-in. Slotter, 3 h. p.
- No. 59—16-in. Traveling head shaper, 3 h. p.
- No. 60—16-in. Shaper, G. XII A.
- No. 61—8-in. Shaper, G. XII A.
- No. 62—84-in. Driving wheel press, 5 h. p.
- No. 63—42-in. Car wheel press, 5 h. p.
- No. 64—36-in. Car wheel press, 3 h. p.
- No. 65—Small hydraulic press.
- No. 66—Gisholt tool grinding machine, G. VI.
- No. 67—No. 1 Cotter drilling machine, G. II.
- No. 68—Driving wheel quartering machine, G. II.
- No. 69—Cincinnati cutter and reamer grinder, G. VI.
- No. 70—Cincinnati No. 2 universal milling mach., G. VI.
- No. 71—Washburn twist drill grinder, G. VI.
- No. 72—Double head bolt cutter, G. XVIII.
- No. 73—1½-in. Acme single head bolt cutter, 2 h. p.
- No. 74—2½-in. Single head bolt cutter, G. XVIII.
- No. 75—5-Spindle nut tapping machine, G. XVIII.
- No. 76—Nut-facing machine, G. VI.
- No. 77—Bolt centering machine, G. VII A.
- No. 78—Water tool grinder, 5 h. p.
- No. 79—Double punch and shear, 7½ h. p.
- No. 80—Bolt pointer, 3 h. p.
- No. 81—Bolt pointer, 3 h. p.
- No. 82—Angle cock grinding machine, 2 h. p.
- No. 83—Swing frame polishing machine, Old tool.
- No. 84—Polishing for buffing—passenger.
- No. 85—Flue cutting off swedging machine, 1 h. p.
- No. 87—1,500-lb. Steam hammer.
- No. 88—500-lb. Steam hammer.
- No. 89—500-lb. Steam hammer.
- No. 90—½-in. Bolt-heading machine, 5 h. p.
- No. 91—Pneumatic flue welder.
- No. 92—Bolt shears, 4 h. p.
- No. 93—10-ft. Boiler rolls, 5 h. p.
- No. 94—Double punch and shear, 5 h. p.
- No. 95—Small single pointer punch, 2 h. p.
- No. 96—Suspended drill.
- No. 97—Flange punch, 4 h. p.
- No. 98—8-ft. Boring mill, with slotter, 7½ h. p.
- No. 100—90-in. Wheel lathe, to swing 88 in., 7½ h. p.
- No. 101—2 x 24 Flat turret lathe, G. XII B.
- No. 102—36-in. Turret lathe, G. VIII.
- No. 103—18-in. Improved Fox lathe, G. VIII.
- No. 104—One Gisholt turret lathe, 3 h. p.
- No. 105—42-in. x 14-ft. Lathe, 3 h. p.
- No. 106—18-in. x 8-ft. Engine lathe, G. VII A.
- No. 107—18-in. x 8-ft. Engine lathe, G. V.
- No. 108—18-in. x 8-ft. Engine lathe, G. VII A.
- No. 109—18-in. x 8-ft. Engine lathe, G. VII A.
- No. 110—42-in. x 14-ft. Lathe, 3 h. p.
- No. 111—42-in. x 16-ft. Engine lathe, G. XII A.
- No. 112—Horizontal boring machine, 5 h. p.
- No. 113—39-in. Vertical boring machine, 3 h. p.
- No. 114—Slab milling machine for boring, 15 h. p.
- No. 115—Vertical milling machine, 7½ h. p.
- No. 116—24-in. Crank planer (floating), 4 h. p.
- No. 117—24-in. Crank planer (floating), 4 h. p.
- No. 118—36-in. x 36-in. x 10-ft. Planer, 7½ h. p.
- No. 119—No. 3 Bickford radial drill, 3 h. p.
- No. 120—30-in. Drill press, 2 h. p.
- No. 121—30-in. Drill press, 2 h. p.
- No. 122—40-in. Drill press (floating), 3 h. p.
- No. 123—40-in. Drill press, 3 h. p.
- No. 124—40-in. Drill press (floating), 3 h. p.
- No. 125—Rod borer, 3 h. p.
- No. 126—8-Spindle drill; arch bar, 5 h. p.
- No. 127—Pipe-threading machine, G. XIII.
- No. 128—Curtis pipe-threading machine, G. XIII.
- No. 129—24-in. Slotter, 4 h. p.
- No. 130—Driving wheel quartering machine, 5 h. p.
- No. 131—Tartiz flue welding machine, 7½ h. p.
- No. 132—24-in. Throat single end punch, 10 h. p.
- No. 133—34-in. Throat single end punch, 10 h. p.
- No. 134—Single-end punch and shear, 15 h. p.
- No. 135—No. 6 Bulldozer complete, 7½ h. p.
- No. 136—3-in. Heading and forging machine, 10 h. p.
- No. 137—One eye bender, Group.
- No. 138—One 125-lb. Bradley helve hammer, Group.
- No. 139—Newton cold-saw, 10 h. p.
- No. 140—4,000-lb. Steam hammer.
- No. 141—48-in. Pneumatic tank riveter.
- No. 142—16-ft. Pneumatic boiler riveter.
- No. 143—1-in. Triple Acme bolt cutter, Group.
- No. 144—Triple bolt cutter, G. XVIII.
- No. 145—Brown & Sharp surface grinder, 3 h. p.
- No. 146—20-in. Wheel and lever-feed drill, ½ h. p.
- No. 147—20-in. Wheel and lever-feed drill, 2½ h. p.
- No. 148—Pneumatic mud ring riveter.
- No. 149—90-in. Wheel lathe; swing 88 in., 7½ h. p.
- No. 150—No. 3 Landis grinder, 12-in. x 42-in. on center, G. V.
- No. 151—Plane milling machine, 4 h. p.
- No. 200—Motor, 25 h. p., machine shop heating fan.
- No. 201—Motor, 25 h. p., machine shop heating fan.
- No. 202—Motor, 25 h. p., machine shop heating fan.
- No. 203—Motor, 25 h. p., machine shop heating fan.
- No. 206—Motor, 15 h. p., blacksmith shop heating fan.

- No. 206—Motor, 15 h. p., blacksmith shop heating fan.
- No. 207—Motor, 30 h. p., blacksmith shop exhaustor.
- No. 208—Motor, 25 h. p., blacksmith shop blower.
- No. 209—Motor, 10 h. p., storehouse heating fan.
- No. 210—Motor, 10 h. p., storehouse heating fan.
- No. 211—Roundhouse steam fan.
- No. 212—High-pressure pump motor, 10 h. p.

(To be concluded.)

#### New Mileage in Texas.

The Railroad Commission of Texas has just issued its annual report of the number of miles of new railroad built in the State during the year to end Dec. 31, 1901. Complete returns have been received from every railroad which has built new main line during the year and these show that the total number of miles built in 1901 is 537, which brings the total mileage of the State to 10,526, including the logging roads. This is the second greatest mileage ever built in the State in one year since 1882, the record year being 1887, when 964 miles were built. The work done during the present year was as follows:

Blackwell, Enid & Texas, from Vernon to the Red River, 12 miles.  
Cane Belt, from Armin to Bay City, 18 miles.  
Chicago, Rock Island & Mexico, across corner of Texas Panhandle, via Dalhart, 21.8 miles.  
Denison, Bonham & New Orleans, from a point near Denison to Bonham, 24 miles.  
Eastern Texas, from Lufkin west, 27 miles.  
Gulf, Beaumont & Great Northern (Santa Fe System), from Jasper north, 15 miles.  
Gulf, Colorado & Santa Fe, from Rayburn to Silsbee, 50 miles.  
International & Great Northern, from Marlin to Waco; Bryan to Navasota, and from Spring west, 87.4 miles.

Missouri, Kansas & Texas, Hunter to San Antonio, 39 miles.

Orange & Northwestern, from Orange to Buna, 30 miles.

St. Louis, San Francisco & Texas (Frisco System), from Red River to Sherman, 6.7 miles.

Red River, Texas & Southern (Frisco System), Sherman to Carrollton, 53 miles.

Texas & New Orleans, from Angelina River to Mahl, and from Athens to Neches River, 44.8 miles.

Texas Southern, from Harleton, to Gilmer, 25 miles.

Timpson & Northwestern, Timpson to Ragley, eight miles.

Total number of miles of new road constructed, 536.7.

The following railroad mileage is projected and located for building during the year 1902, the greater part of which is already under contract and now being constructed:

Denison, Bonham & New Orleans, from Bonham to Wolf City, 20 miles.

Eastern Texas, four miles.

Gulf, Beaumont & Great Northern, from Brookland to Center, 57 miles.

Houston & Texas Central, from Burnetto Lampasas, 25 miles.

International & Great Northern, from Waco to Fort Worth, and from a point west of Spring to Navasota, 130 miles.

Fort Worth & Rio Grande (Frisco System), from Brownwood to Brady, and terminals in Fort Worth, 55 miles.

Texas Southern, from Gilmer to Winsboro, 25 miles.

Kansas City, Mexico & Orient, from the Red River to the Rio Grande, via Sweetwater and San Angelo, 554 miles.

Choctaw, Oklahoma & Gulf, from Amarillo to State line, 110 miles.

St. Louis, Southwestern, from Gatesville to Hamilton; from Renner to Dallas, and from Hillsboro to Whitney, 60 miles.

Texas & New Orleans, from the Neches River, via Jacksonville to Mahl, 55 miles.

Total prospective new mileage in Texas for the coming year, 1,095.

There are about 200 miles of unchartered logging roads in the State which are not included in the total mileage statement given above. These unchartered roads, as well as the chartered logging roads, are not recognized by the Railroad Commission as railroads. A number of these roads made extensions during the year which are not embraced in the statement given above.

#### Railroad Progress in Michigan During 1901.

The new mileage built in the State of Michigan during the year ending Dec. 31, 1901, totals 204.5, by 17 companies, as against 126.3, by nine companies, last year, and 168.8, by 13 companies, in 1899. The detailed report is as follows:

Caro & Lake Huron, 20 miles, from Caro to Owendale, where it connects with the Pontiac, Oxford & Northern Railroad. This line is operated by the Michigan Central Railroad, and is also reported by that company.

Chicago & North Western, 7.75 miles of logging and mining branches built.

Chicago, Kalamazoo & Saginaw, 11 miles built from Kalamazoo to Pavillion, where it connects with the Grand Trunk Western Railway.

Copper Range, two miles built during year.

Detroit & Charlevoix, two miles of extension built during the year and total main line mileage now in operation, 42 miles. This mileage has never been reported in the State for the reason that the company was not regularly incorporated until this year.

Detroit & Toledo Shore Line.—This company, although organized under the general railroad law, has built about 50 miles from Toledo, Ohio, to Trenton, Mich., and is equipping it to be operated by electricity.

Detroit & Mackinac, 23.35 miles of main line built from Lincoln Junction to Black River, and 7.27 miles logging branches in Cheboygan county.

East Jordan & Southern, six miles built, from Hitchcock to Bellaire.

Escanaba & Lake Superior, 12 miles built during the year, from Northland to Kates.

Grand Trunk Western, 11.02 miles of new diversion track at Flint built, and 56.28 miles double track on its main line.

Harbor Springs, three miles built from Harbor Springs to Stutesman's Mill and Cary's Mill.

Ludington & Northern, three miles built. This line is only operated during the resort season, from Ludington to Hamlin Lake.

Michigan Central, eight miles of logging branches, and double track built from Ann Arbor to Dexter, completing double track on its main line from Detroit to Jackson.

Munising, 17 miles from a point near Munising Junction to Forest Terminus.

Mason & Oceana, five miles, from Stetson to Hesperia.

Onaway & North Michigan, four miles of logging road, near Onaway.

Pere Marquette, 12.19 miles built from Greenville to Stanton.

#### Locomotive Piston Valves.

From a long experience in designing piston valves for locomotives Mr. John Player, Mechanical Engineer of the Brooks Locomotive Works, spoke on this subject at the November meeting of the Central Railway Club, and we give some of his remarks and extracts from the discussion that followed. It is interesting to note that the Brooks Works is now scheming out a new design of solid piston valve. Supplementing what was said of the use of solid piston valves on locomotives of the Atchison, Topeka & Santa Fe, we may add that within two months we have received a report of the general overhauling of Santa Fe engine No. 999, which has worked since 1899 with piston valves having no packing rings. We are informed that the set of valves which was in this engine when it came in for general repairs had been in use for a year and that, in the language of our informant, they were "still too good to throw away," and were restored to service without repairs. The amount of wear was very little on the circumference, at that part of the valves where the most wear had taken place, namely, on the bottom. As our readers know, such valves as these have been in use on seven locomotives of the Santa Fe for the greater part of the time since 1899, and while they have not been adopted as standard on the System there seems to be much in their favor.

The information that Mr. Player (Brooks Works) gave about the way the Santa Fe cylinders were made is somewhat incomplete. On two passenger locomotives, No. 697 and No. 698, the cylinders were cast separately from the saddle and the piston valve chests were integral with the cylinder castings, as he has said, but on the five consolidation freight locomotives, Nos. 995 to 999 inclusive, the cylinders were cast integral with the half saddle, and the valve chests were mounted separately. The cylinder and saddle castings of the consolidation locomotives were illustrated in the *Railroad Gazette*, June 16, 1899, and the corresponding parts of the passenger locomotives were illustrated, Jan. 12, 1900. Engine No. 999 and the other four freight engines have been working more than a year as pushers, or double-heading, over Raton Pass, where about half of their mileage is made drifting with the throttle closed. This statement, taken in connection with the record of very slight wear of the valves which we have mentioned, may have some bearing on that part of the Central Club's discussion in which Mr. Owens mentioned excessive wear of valve-gear, which was supposed to have resulted from use of piston valves in engines running a good part of the time with the throttle shut.

Mr. Player said, in part, that the "matter of piston-valves is somewhat old. Piston-valves have been applied in stationary and marine practice for a great number of years. In locomotive practice in the United States, however, piston-valves have only been employed in the last 10 or 12 years. I believe that the first piston-valves, in what you might call a piston-valve cylinder especially designed for locomotive service, employed in this country, were upon the Vaucrain compounds. There may have been some earlier piston-valves of which I have no data at the present time. I think the first piston-valves applied to simple engines were applied about 12 years ago by Mr. Hatswell, who was then general master mechanic of the Flint & Pere Marquette road. These were applied in place of an ordinary slide-valve, in an ordinary steam chest, with a loose cage for the reception of the valve. The valves were made of small diameter and just the same length as an ordinary slide valve, and the dimensions of the faces of the valve and the ports were practically the same. The form of packing applied



in these valves was what was used in the old country on the old Tremaine valve, consisting of three sections or rings on each end and a central spider, having recesses for the rings on the two ends and a follower bolted on each end. The rings were made L-shaped at their edges so as to extend over the edges of the follower and the piston-valve body and give a square cut-off edge. The two exterior rings were arranged with a break joint and locked together and sealed on the inside with a third flat ring. A similar but larger valve was applied later.

"Some three years later a similar form of valve was employed in some large 12-wheel engines built by the Brooks Locomotive Works for the Iron Range & Huron Bay Railway. They gave very good results, but owing to the complication attending their application, that is, the necessity of using a separate cage in the steam-chest, and the increased cylinder clearance, there was really nothing to be gained by them. The port-opening or port area, rather, was precisely the same as used in the slide-valve. The only feature gained was the freer handling of the engine on account of the reduction of friction on the valves.

"Some six years ago the Brooks Locomotive Works took a contract to build some very large 12-wheel engines for the Great Northern Railway. These engines were the largest in the world at that date and were specified to have cylinders 21 x 34 in. and carry 210 lbs. boiler pressure. The question arose, could a slide-valve be advantageously employed in a cylinder of that size without getting an undue cylinder clearance due to increased length of the ports, without increasing the length of the valve so as to make it unwieldy? It was suggested at one time to use a slide-valve and separate it into two parts, having a separate exhaust cavity in each half. That scheme was laid aside and in place thereof a piston-valve was designed which would allow steam ports of the requisite area to give the proper cylinder clearance and incidentally give larger port areas and larger cut-off edges, and also one that could be handled easier than a slide-valve. These engines proved very successful in operation and others were ordered, exact duplicates of them. About a year later we commenced the application of piston-valves in earnest. We became satisfied that the piston-valve was the proper thing to apply to high-pressure locomotives.

"The valves previously described which were applied to the Great Northern engines had an external admission and were located on the outside of the frames, in the same position as the ordinary steam-chest would be. This, of course, necessitated a double-bar frame construction, and, as you all know, the double-bar frame construction is open to criticism when used in connection with heavy engines having four-wheel trucks. The length of the frame between the cylinder and the forward pair of drivers is such that strains are set up in it that are unequal and sometimes cause the fracture of the frame, especially when the pedestal-ties or binders are allowed to become loose. To overcome this it was deemed desirable to apply on large engines with four-wheel trucks a single-rail frame if this could be got in in a satisfactory manner. The piston-valve lent itself very readily to this design. Inasmuch as instead of having to keep the lower rail of the frame down, as is necessary with a slide-valve cylinder, in order to get sufficient depth of metal through the cylinder saddle to withstand the strains set up therein, the frame-rail could be raised up in a central position, not only in the line of thrust of the cylinder but also in the line of pull of the draw-gear, which is quite an important feature in modern heavy locomotives which frequently have to be coupled up to use the head-end in heavy service. By using this single-rail frame in the position described we were enabled to locate the steam-chest or chest for the piston-valve on the inside of the frame; or rather, properly speaking, about over the top of the frame, leaving sufficient metal in the cylinder above and below the piston-valve chest itself to make a very strong and rigid cylinder casting. In the construction of cylinders of this kind, it also became apparent that internal admission should be used in place of external. The advantages of internal admission are self-evident to any one, in that it presents the most direct passage for and the smallest possible condensing surface to the live steam before it is admitted to the cylinder.

"In the earlier forms of cylinder with internal admission the exhaust cavities from the ends of the cylinder were carried into one common cavity in the center, as is customary in the slide-valve cylinder. In our recent improvements in the construction of piston-valve cylinders we have separated the exhaust cavities in the cylinder and also a part of the way up the exhaust pipe. This overcomes entirely the prejudice which has been expressed by engineers against the piston-valve engine, that she did not exhaust like an ordinary slide-valve engine, did not have the snap or bark to it, this lack of snap or bark to the exhaust being due to the fact of the exhaust from the two ends of the cylinder uniting in one large chamber. While this in itself is not detrimental to the performance of the engine, yet it makes an engine with piston-valves sound as if she were muffled in the front end, and in order to overcome this we simply separated the two exhaust cavities and made an exhaust pipe with four openings at the bottom instead of two, with the result that the exhaust of the piston-valve engine as we construct them now is exactly the same as that of a slide-valve engine.

"With regard to the valves themselves, there are many forms of packing used. The first packing which I de-

scribed a while ago was that known as the Tremaine packing, used in the old country several years ago upon many stationary engines, and also, I believe, attempted in locomotive practice in one or two railroads. This packing did very good service as long as the pressure was kept down. When we applied our internal admission valves we tried them with this same form of packing. It was claimed that there was too much friction to the valve, and in order to overcome this we changed the form of packing somewhat, with a better result, but finally adopted a form of snap-ring packing which is not strictly a snap-ring inasmuch as the rings cannot be snapped over. The rings in this snap-ring packing are turned up just  $\frac{1}{32}$  in. larger than the diameter of the steam chest bore and are provided on the edge that fits against the bull-ring with a lip on the under side, projecting  $\frac{1}{16}$  in. into a corresponding recess in the bull-ring to prevent any portions of the ring dropping into the port in case it should break up. In the first rings of this sort applied they were simply rectangular in section on the cut-off edge. Later we went back to our first form of L-shaped ring and allowed them to project over the edges of the valve and also of the follower, forming a perfectly square cut-off edge of sufficient depth. Some time ago we tried another form of valve-packing. This packing is used very extensively in marine service and gives excellent results in marine engine cylinders. It consisted simply of one solid ring ribbed on the inside and having a split in it cut diagonally and shimmed apart said ring being bolted together through internal lugs so as to make a solid ring of it, the intention being to adjust the ring to the exact diameter of the bushing and insert new shims in it as the bushing and the ring wore. However, the locomotive cylinder is altogether a different proposition from the marine engine cylinder. In the marine engine the steam-chest is cast upon one side of the cylinder and is practically a symmetrical structure in which the strains of expansion and contraction are uniform throughout. In the locomotive cylinder with the steam-chest located midway between the barrel and the smoke-box saddle, the strains are altogether different.

"We found that there was considerable distortion to the steam-chest, even with heavy bushings, between the normal temperature of the cylinder when cold and its working temperature when hot, so much so that a ring as above described could not be run satisfactorily. We found that the best form of ring is the angular or L-shaped snap-ring just described. There has been some attempt to use solid piston-valves. I believe that Mr. Player of the Santa Fe has used solid piston-valves in his tandem compounds. The construction of the cylinders on this engine, however, is altogether different from the ordinary locomotive, the cylinders themselves being cast entirely independent of the saddle and separately attached to a large saddle casting between the frames, so that the form of the cylinder and steam-chest is more like that of a marine engine than a regular locomotive. I presume that in these cylinders the distortion strains set up by expansion and contraction are considerably less than in the ordinary locomotive cylinder saddle, consequently he has been able to use these solid piston-valves with some degree of success. I have not any precise reports regarding the operation of these solid valves, but I know they are still using them and claim that they are giving good satisfaction. Some couple of years ago we tried to use a solid valve ourselves, but we found that it was impossible to get a proper working fit between the valve and the bushing in ordinary locomotive cylinders, so it was abandoned for the present, although we are working on a new design of solid valve which we expect to be entirely satisfactory.

"With regard to the operation of piston-valve engines, it has become an established fact that with piston-valves applied to identically the same engines as slide-valve, and in all respects precisely similar, with the exception of the piston and slide-valve arrangement, the piston-valve engines are giving better results and showing greater economy in fuel than the slide-valve engines. There has been a considerable amount of prejudice on the part of some people against the piston-valve. I do not know why this prejudice exists, but it is gradually being overcome. The future supremacy of the piston-valve is certainly assured. In the construction of engines at the Brooks Locomotive Works at the present time nearly all the contracts on our books call for engines with piston-valves; that is, all with the exception of some small engines and some duplicate orders of older engines that were originally equipped with slide-valves. This in itself speaks for the favor with which it has been accepted.

"With regard to the motion for operating piston-valves. As I stated a while ago, the first valves we applied had external admission, calling for rocker-arm or regular American motion, the same as applied to a slide-valve. When we applied internal admission-valves this, of course, reversed the motion of the valve with regard to the cylinder. Consequently, the eccentrics, where rocker-arm motion was employed, had to be reversed on the axle and the rods crossed. This gives a slightly greater distortion to the valve motion than an open-rod motion. In the later designs of engines that we have been getting out we have changed the valve motion from a rocker arm to a direct motion with an angular connecting-rod, operating a vertical double-ended rocker, having both arms above the pivot point to actuate the valve. With this valve motion an almost absolutely perfect distribution of steam can be obtained. In fact, the distri-

bution is far better than can be obtained from the very best motions applied to slide-valve engines.

Regarding the benefit of using piston-valve cylinders independently of the benefits of piston-valves themselves, there are incidentally many features in the construction of the locomotive which are benefited thereby. In the first place, the piston-valve cylinder and all its appurtenances weighs somewhat less than a first-class slide-valve cylinder and its appurtenances of equal capacity. Consequently, you are carrying around considerably less dead weight upon the front end of the engine, and in cases where the weight of the engine is limited, this weight that is saved in the cylinders can be advantageously employed in the boiler and elsewhere to much better advantage. Another feature is that it gives you a far better frame construction at the front end and a better valve motion. Your valve motion is much more compact. Many forms of consolidations and 10-wheel engines built with slide-valves, in order to secure a proper valve motion require to have the link and rocker coupled up with intermediate hangers and motion rods, involving a great many points for lost motion in the valve motion. In the use of a piston-valve motion this becomes direct and reduces the number of points for lost motion very considerably.

"Another advantage in the use of piston-valves is that, owing to the valve motion being placed entirely inside the frames, it is no longer necessary to space the forward and second pair of wheels at such a distance as to provide room for your rocker, as is necessary upon a slide-valve engine. This enables you, in the construction of your engines, where the wheel base is limited, to use driving wheels of larger diameter, or, where the wheel base is not limited, to arrange your wheels in such a manner as to get a better and more substantial driver-brake arrangement and a better distribution of weight. Incidentally, also, the piston-valve arrangement enables you to use a better form of spring-rigging than can be used upon a slide-valve engine at the front end. It allows you to raise the lower rail of the frame, at the front end, higher up than can be done on a slide-valve engine, consequently you can use larger truck-wheels in your engine. All these certainly are advantages which can not be obtained on a slide-valve engine."

Mr. Owens.—My experience has been somewhat limited in the use of piston-valves and I would like to ask for a little information regarding one or two points, one of which is in reference to the wear of the valve motion. An engine came to my notice about six or seven months ago; it was in the shop; and there was more wear to the eccentrics valve motion in three months time than with the ordinary slide-valve in six to eight months time. I also noticed, on another road, a parallel line, using identically the same class of engine, and in fact the same kind of service, they had no trouble whatever. In one of those cases I speak of they had the piston-valves out of the engine and I must say that the inside looked as smooth as a piece of glass, and the man who ran the engine claimed that the reverse lever could be handled at any time with one hand with steam on the engine. They claim that the wear came while the engine was shut off, and that it did not come while the engine was working, and that the water was carried at the proper height in the boiler as well.

President West.—I heard that same objection to the piston-valve, especially on mountain roads where the engine was running down hill considerably; that it was a serious objection; and I think, also, from a transportation point of view, that the most serious objection that has been raised to the piston-valve is that the engine was out of service longer in making the repairs. But if what you say is true there ought not to be much repairs to a piston-valve. How do you propose to take up the wear of the cylinder? The casing must eventually wear so that it will require a re-boring or a new piston to make it fit. I understood you to say, that the second set-rings or head, which you applied, which was practically a solid head, did not work. Now, in refitting the piston to the case, whether you put in a new bushing or whether you put in a new piston, what is the result? That is, from an operating point of view?

Mr. Player.—In regard to the wear of piston-valves—this, when cylinders are properly lubricated, is very slight. As I described before, the valves are equipped with packing-rings which are turned slightly larger than the bore of the bushing, having about  $\frac{1}{32}$  in. spring. These packing-rings require renewal probably once in 18 months to three years, according to the kind of service that they may be in. I have seen several engines that have been in service from two to two years and a half, from which the valves have been taken out with the original packing-rings in. The bushings have been calipered and found to be perfectly true; you could hardly detect any variation in the diameter of them at any point; the valve bodies or bull-rings themselves were only worn a very little just on the bottom. These valves—I don't think I stated—are supported at both ends by the stem so that all that bears on the bushing itself is the packing-rings; that is, when the stem-bushings are kept in proper order. With average wear, I should say, of piston-valve packing rings, they ought to run about two or three years. Then they are renewed, the same as the ordinary cylinder-packing.

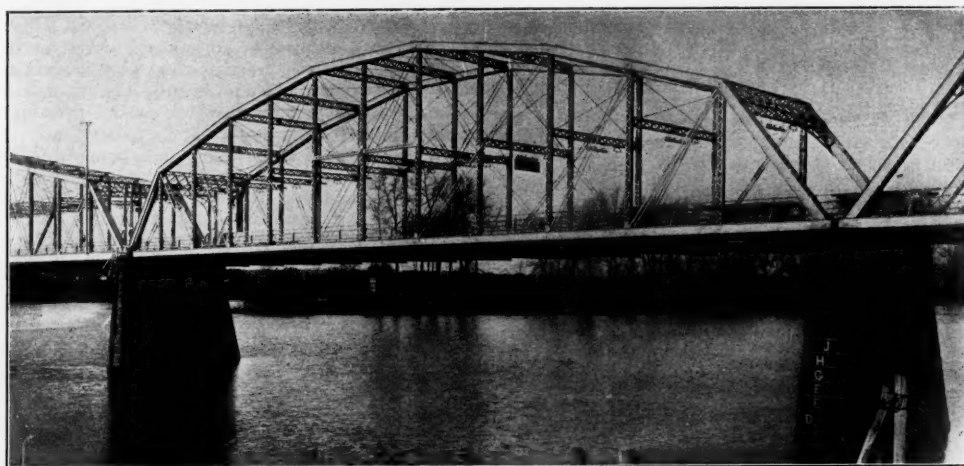
The gross earnings per mile of all the railroads in the German Empire (44,427 miles) in the month of October were 4.3 per cent. less from passengers and 5.44 per cent. less from freight this year than last.



### The Middletown (Conn.) Bridge—The Longest Highway Draw Span.

BY H. G. TYRRELL, C. E.

The highway bridge across the Connecticut River at Middletown, Conn. (built in 1896), is 1,300 ft. long, with a 26-ft. roadway, and provision for two 6-ft. sidewalks. Beside the street traffic it carries a line of electric railroad, connecting Middletown with Portland. It consists of two fixed spans 200 ft. center to center of piers; two fixed spans 225 ft., center to center; one draw span of 450 ft., center to center. The position of an island, with the channel on the west side, required the draw span to be about in the center of the river.



One Fixed Span of the Middletown Bridge.

thus making a symmetrical arrangement for the span. The government required two clear waterways of 200 ft. each, which fixed the length of draw at 450 ft. This is believed to be the longest highway drawbridge in the world; a comparison table is given below. This table does not include a number of long span railroad drawbridges that have a highway attached.

Middletown Bridge	450 ft. long.	
Macombs Dam	412 "	"
Third Ave.	300 "	"
Harlem Canal	270 "	"
Cleveland	279 "	" in two spans.
Charlestown	240 "	"

Notwithstanding its being 30 miles from sea, there is a tide of  $2\frac{1}{2}$  ft., and the highest known water mark is 25 ft. above low water. The floor of the bridge was placed 6 ft. above the last elevation, making the distance from floor to low water 31 ft. At low tide the depth of water in the channel is 16 ft.

**Superstructure.**—The width of bridge for two lines of carriage travel, and one line of electric cars required 26 ft. center to center of trusses. Provision is made on the floor beams for connecting sidewalk brackets in the future. The floor is designed to carry a live load of 100 lbs. per sq. ft., 14-ton electric cars or a 10-ton wagon. The trusses are proportioned for a live load per foot of bridge of 1,500 lbs. for chords, and 2,000 lbs. for web. The material used was iron for eyebars and lateral rods, and the balance, excepting machinery, is medium steel.

The bridge has a wood floor, consisting of 4-in. x 14-in. yellow pine joist vulcanized, spaced 2½ ft. apart, and two layers of spruce plank. The lower is 3 in. thick, kyanized, laid diagonally, and the upper 2 in. thick square

casting by the usual radial braces and spider frame. This center casting is set down 6 in. into the stone pier, and secured to it by means of eight bolts 1½ in. in diam. and 6 ft. long, built solid into the pier. This casting has a hollow center for the passage of wires up to the bridge.

The draw is operated by three 25-h.p. electric motors of railroad type, one for turning, and the other two for blocking up the ends. Besides these there is a fourth motor, and a duplicate set of turning machinery all in place which can be used in case of unbalanced wind pressure, or a breakdown in the other machinery. These two sets can be worked independently, or together, at the will of the operator. Power is taken from the Middletown street wires, and a cable is laid on the river bottom, and

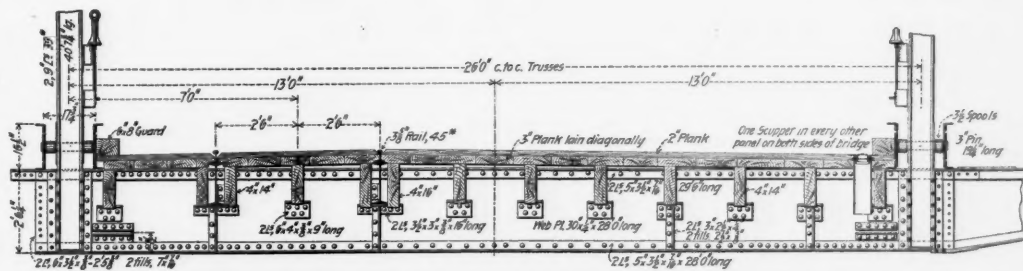
ence shows that for long draw spans, this method is not satisfactory as too much power is lost by friction in the boxes. The calculated deflection of the ends was  $3\frac{3}{4}$  in., and after the bridge was completed and levels taken, the actual deflection was found to be  $3\frac{3}{4}$  in.

Blocking up the ends is done by means of a pair of toggles at each corner. These are drawn together by two bronze nuts working on a right and left hand screw, that is turned by bevel gears from the motor. To prevent these nuts from jamming, there are electric signals that tell the operator when to shut off his power. As a general rule, it is intended to simply block the ends up tight. This requires but very little power. But as there is always the liability of the blocks becoming tight from change of temperature or other causes, the end machinery was proportioned to lift 50 tons at each corner,  $1\frac{1}{2}$  in. in 10 seconds. This required 10 h.p., but it was thought best to use the same kind of motor used at the turntable giving interchangeable parts. To provide for expansion the end toggles rest on cast-steel rockers of  $17\frac{1}{2}$ -in. radius, which, in turn, bear on cast-iron pier plates, blocked up to the right elevation with shims. The floors of fixed span and draw were made to level up by notching the joist.

The latch is an extra heavy swinging gravity latch, to which is attached a line of No. 10 wire passing over pulleys to the center and connected by means of bell cranks with the operator's house.

To open by electric power takes 30 seconds, and the power required to overcome an unbalanced wind pressure of 5 lbs. on one-half of bridge is 30 h.p. Ordinarily, however, in calm weather 5 h.p. is sufficient to turn. It was necessary to use about four times the amount of resistance, ordinarily used on street car work with the same motors. The reason for this is evident when the relative weight of bridge and car is considered. Both the center and end sets of machinery are provided with clutches which can be thrown out of gear, and the operation performed by hand power. Working on 10-ft. levers the bridge is turned by four men in eight minutes. There is a friction brake applied to a drum on the highest speed turning shaft. This and the other turning machinery, including the motor, are placed on the outside of drum beneath the floor, in a machinery frame that can be sheathed in and protected from snow and ice. The whole bridge is well lighted with incandescent lamps, and has also the usual signal lights required by government.

The total weight of drawbridge superstructure, includ-



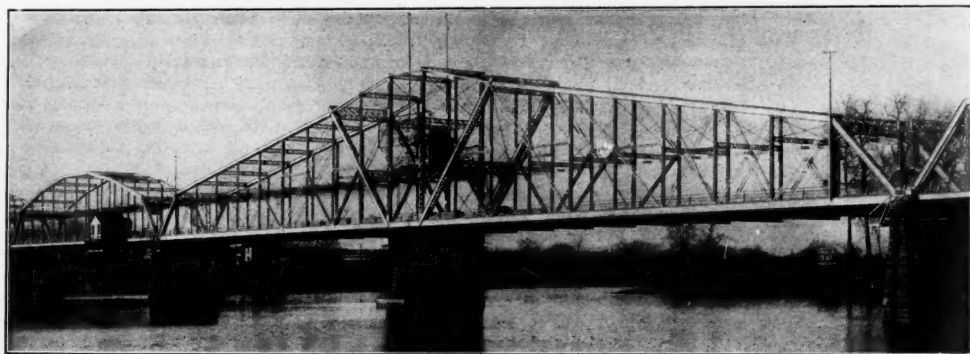
### Floor System—Middletown Bridge.

(*Gazette*, May 25, 1900.) While these would cost \$950 for the two gates, they would do away with the services of two gate operators. But, on account of an accident to the substructure involving extra expense, the steel gates and some other machinery were omitted. This last was an arrangement for closing the space between the ends of rail, where the draw and fixed span join. In

ing drum and flooring, is 690 tons. This does not include snow or any live load.

*Substructure.*—The foundation for this bridge consists of two abutments, four river piers and a circular draw pier. The maximum depth of water in the channel at low tide is 16 ft. All of the piers and the Middletown abutment stand on pile foundations. The Portland abutment is built on solid rock found 6 ft. below the natural surface of the ground. The masonry throughout is laid in regular courses varying from 18 to 30 in. in thickness. The top of the timber grillage in all cases is a foot and a half below extreme low water line. Apart from the draw pier the Middletown or west abutment is the heaviest piece of work, containing 815 cu. yds. of masonry. It stands on 171 piles cut off 3½ ft. below low water. It has stepped wing walls running back at an angle of 60 deg. with the face. The piles are capped with a solid grillage 2½ ft. in thickness. It was necessary to excavate about 13 ft. in order to place the timber work all below water line. The height of this abutment from the top of grillage to the bridge seat is 31 ft. 6 in. It has a thickness at the base of 13 ft. tapering up to 14 ft. 9 in. under the coping. It has also the usual back wall at the rear of the bridge seat 2 ft. in thickness.

The only serious accident occurring at any time on the construction of this work happened to this abutment. After the steel work had been placed and the bridge practically completed, the south end of the Middletown abutment moved forward about 4 ft. throwing the shoe clear off the bridge seat and bringing the weight of one entire corner of a 225-ft. span on to the lower chord and bottom lateral rods. This accident was due largely to the wash around the piles from the ferries that had a landing close up to the abutment. The placing of rip rap had been delayed as long as possible to accommodate the ferry company. It is supposed that the washing of the paddle wheels undermined the piles at this corner, causing them to break off. False work was at once placed under the first panel point and the bridge jacked up so as to throw the entire weight of one end of the span on timber work. The earth filling behind the abutment was then removed and the entire abutment taken down. New piles were driven and rip rap placed, after which the old stone



### 450-ft. Draw Span—Middletown (Highway) Bridge.

across. Both layers are dressed on one side. The stringers for car track are 15-in. steel beams, weighing 42 lbs. per ft. On each side of road is a lattice railing with a 1½-in. pipe top.

The proportions selected for the trusses are:

200-ft.	fixed	span,	12	Panels,	Depth	21 to 37 ft.
225-ft.	"	"	12	"	"	21 to 37 "
450-ft.	draw	"	20	" (@21' 3")	"	21 to 55 "
			1	" (@22')		

The turntable is entirely rim-bearing. Eight loading beams transfer the weight to 16 points on the drum, which is 4 ft. deep, and 31 ft. in diam. This stands on 64 cast-steel wheel 8 in. x 16 in., which run between cast-steel beveled treads 2 in. thick at center. The lower tread rests on wrought steel plates bolted to the masonry. The drum and wheels are secured in place to a center

cold weather this opening is liable to be 2 in. or more. As this would cause a serious jar to cars and possibly a derailment, the author had designed machinery to close this space, while the toggles were tightening. There is also a lifting steel apron plate, to cover over the curved opening in the floor at the end of draw, to lift up before the bridge is opened. Instead of the moving rail, an ordinary split rail is used that can be adjusted occasionally with the changing seasons, and instead of the safety gates, a pair of temporary wood ones are now in use.

As already stated, the blocking up of the ends is done by two separate motors at the ends of draw placed beneath the floor. It is not infrequent to bring power from the center by means of a shaft, but the writer's experi-



work was rebuilt on the original plan. The depth of fresh filling at the back of this abutment was about 20 ft. and as there had been heavy rains the sinking of the fill probably helped to cause the accident.

The center pier stands in 16 ft. of water at low tide, on 185 piles that are cut off 3 ft. above the river bed. The height of stone work is 29 ft. and the diameter under coping 35½ ft., battered out ½ in. per ft. It is built solid, outside courses being ranged work, varying from 30 in. at the bottom to 18 in. at the top. An octagon timber caisson 40 ft. in diam., with sides 9 ft. high, was built at Hartford by ship carpenters and tightly calked. It was towed down the river to Middletown and guyed in position over its foundation and as the stone pier was built inside it gradually sank on to the piles. There was very little trouble from uneven settling, as stone work was laid around in courses. The intention was to remove the sides of the caisson after the pier was completed, leaving only the bottom to serve as grillage over the piles.

After the bridge was completed the writer took occasion to make observations of the vibration caused by heavy spring freshets when the ice was breaking up. To an engineer who has confidence in his work the effect of such vibrations would probably not cause any alarm, but it does seem possible that with a crowd on the bridge a panic might easily be caused. As the ice piled up on the cut waters blocks 20 to 30 ft. and several feet in thickness, the tremor of the whole structure was very apparent. This, of course, would be entirely avoided had the foundation been carried down to solid rock which, of course, would have been a much more expensive construction.

**Erection.**—There was no especial difficulty met with in the erection of this bridge. The fixed spans were assembled on false work and the draw erected in a similar manner with the bridge open. There occurred two or three freshets and some little timber work was taken out, but not a pound of steel was lost. The only time when any real anxiety was caused was near the end of the erection of the draw span when a heavy freshet washed out the false work from one end. Fortunately, the work was all connected though no riveting had been done. The draw is built in without any fender pier and the span is reversible excepting that the railway track is on one side. The whole bridge, not including the rebuilding of the west abutment, and not including the earth filling at either end, cost about \$180,000.

At the time this bridge was built the Chief Engineer for the Berlin Iron & Bridge Co., who were contractors for the work, was Mr. Charles M. Jarvis. The preliminary estimates with number and length of spans, was determined in the estimating department of that company. The matter was then turned over to the writer, who was their Assistant Engineer. On going over the entire design the writer found it necessary to change the form and outline of both the draw and the fixed spans and to refigure and reportion the members. He then proceeded to design the machinery and all other structural details connected with the work. The fixed spans required 25 sheets of drawings and the draw spans 83 sheets. Mr. Graves, of Hartford, was in direct charge of the foundation work, and John Devin was Erection Foreman for the superstructures. The owners are the Middletown & Portland Bridge Co., for which F. L. Wilcox is Treasurer.

#### For Industrial Peace.

At the recent meeting in New York of the Industrial Department of the National Civic Federation it was decided to form a committee of 36 to advise some means whereby the relations between capital and labor may be improved and strikes averted or settled. The following committee was appointed:

##### Representing Capital:

United States Senator M. A. Hanna, of Ohio.  
Chas. M. Schwab, President of the United States Steel Corporation.  
S. C. Callaway, President of the American Locomotive Co.  
C. A. Moore, of Manning, Maxwell & Moore, President of the National Tool Co.  
J. D. Rockefeller, Jr., representing the Standard Oil Co. and allied interests.  
H. H. Vreeland, President of the Metropolitan Street Railway Co. of New York.  
Lewis Nixon, President of the Crescent Ship Yard Co.  
James E. Chambers, President of the American Glass Co.  
W. H. Pfahler, President of the National Association of Stove Manufacturers.  
Julius Kruttschnitt, assistant to the President of the Southern Pacific Railroad.  
E. P. Ripley, President of the Atchison, Topeka & Santa Fe Railroad.  
Marcus Marks, President of the National Association of Clothing Manufacturers.

##### Representing Labor:

Samuel Gompers, President of the American Federation of Labor.  
John Mitchell, President of the United Mine Workers of America.  
F. P. Sargent, Grand Master of the Brotherhood of Locomotive Firemen.  
T. J. Shaffer, President of the Amalgamated Association of Iron, Steel & Tin Workers.  
James Duncan, Secretary of the Granite Cutters' National Association.  
Martin Fox, President of the Iron Molders of America.  
J. E. Lynch, President of the International Typographical Union.  
Edward E. Clarke, Grand Conductor of the Order of Railroad Conductors.

Henry White, Secretary of the Garment Workers of America.

Walter Macarthur, editor of the *Coast Seaman's Journal* of San Francisco.

James O'Connell, President of the International Association of Machinists.

##### Representing the Public:

Grover Cleveland, former President of the United States.  
Archbishop John Ireland, of the Roman Catholic Church.  
Bishop H. C. Potter, of the Episcopal Church.  
Cornellius N. Bliss, former Secretary of the Interior.  
Charles Francis Adams, of Boston, former President of the Union Pacific Railroad.  
Charles W. Elliot, President of Harvard University.  
Franklin McVeagh, of Chicago, attorney.  
James H. Eckels, former Comptroller of Currency of the United States.  
John J. McCook, of New York, attorney.  
John G. Milburn, of Buffalo, attorney.  
Charles J. Bonaparte, of Baltimore, attorney.  
Oscar S. Straus, of New York, President of the National Civic Federation.

The committee was organized with the following officers: M. A. Hanna, Chairman; Samuel Gompers, First Vice-Chairman; Oscar S. Straus, Second Vice-Chairman; Charles A. Moore, Treasurer; Ralph M. Easley, Secretary.

The General Committee adopted the following declaration of principles and purpose:

This committee shall be known as the Industrial Department of the National Civic Federation.

The scope and province of this department shall be to do what may seem best to promote industrial peace; to be helpful in establishing rightful relations between employers and workers; by its good offices to endeavor to obviate and prevent strikes and lockouts; to aid in renewing industrial relations where a rupture has occurred.

That at all times representatives of employers and workers, organized or unorganized, should confer for the adjustment of differences or disputes before an acute stage is reached and thus avoid or minimize the number of strikes or lockouts.

That mutual agreements as to conditions under which labor shall be performed should be encouraged, and that when agreements are made the terms thereof should be faithfully adhered to both in letter and spirit by both parties.

This department, either as a whole, or a sub-committee by it appointed, shall when requested act as a forum to adjust and decide upon questions at issue between workers and their employers, provided in its opinion the subject is one of sufficient importance.

This department will not consider abstract industrial problems.

This department assumes no powers of arbitration unless such powers be conferred by both parties to a dispute.

Much the most important speeches delivered at the meeting were those of Mr. Hanna, Archbishop Ireland and Mr. Schwab, and from these we give extracts.

Mr. Straus read a statement, said to be from Senator Hanna, as follows:

"I would rather have the credit of making successful the movement to bring labor and capital into closer relations of confidence and reliance than be President of the United States. If by resigning my seat in the United States Senate I could bring to fruition the plans that we are now fostering to make strikes, lock-outs, and great labor disputes impossible, I would gladly do so. I think it is the grandest thing that could be accomplished in this country. I would want no greater monument than to have the world remember that I did something to end wars between American labor and American capital."

Mr. Hanna said that the sentiments attributed to him as read by Mr. Straus were his. "They came from the heart and they came after a long experience in the industrial world and almost daily contact with labor since I have been a man of business. In 1874 it happened for the first time I had direct dealing with a distinct labor organization. That was the year that the National Bituminous Coal Miners' Association of the United States was formed. The President of that organization and its Secretary called upon me. It was a year which followed a long and disastrous strike. They read to me their constitution and by-laws:

"I said to them: 'Gentlemen, if you mean what you have said in those articles I am with you. If it is your purpose and determination to lay the foundation for a better understanding between capital and labor I will give you my hearty co-operation.' And, having become convinced that there was sincerity in their purpose, I immediately took up the operators' side of the question, and in a short time we had an operators' organization, a committee appointed from each to whom was to be referred all differences and difficulties to be settled by arbitration.

"During the life of that labor organization all troubles and differences were settled by arbitration. That incident made me an advocate in favor of organized labor.

"And from that day until to-day I have been a believer that at some time that sentiment might dominate, and the results from it would be what I have always dreamed of and hoped for. From that day until to-day I have never ceased in my individual capacity to work to secure those results. During those years I have seen and been in contact with many differences between capital and labor. I have studied the proposition from every standpoint, never abandoning the hope, as I saw from appearances on both sides a near approach to a better understanding. Therefore I say I never have abandoned the hope that that day might come. And in this presence and in the interest which I see manifested by those here to-day, I believe the day is near at hand."

Archbishop Ireland said:

"I know the employers' ideas in this country, and they are human. They realize that they are brothers of their fellowmen. And we do not deny that great principle that we must do justice to laborers, to workingmen. On the other hand, I have not met the workingman who on sober thought will not understand that his arms are of no account to earn a livelihood for himself unless assisted by the leaders of industry who will gather in the finances needed to purchase machinery and open markets, who does not realize that he himself cannot secure for himself and his family the comfort that he desires unless there be the capitalists, unless there be the employers. Nor are there any laborers to-day in America who on sober thought will not realize that whatever may be the equality of men as to legal and political rights, that from the very fact of the constitution of each man as he now is there is diversity, and as men go through a thousand circumstances of life there is a diversity of circumstances, and there must be consequently more or less, necessarily so, of inequality in the possessions of the things of earth.

"Now, why is it that, despite these convictions which prevail in America, we have had strikes and difficulties and misunderstandings? Simply because we have kept apart. We have not come enough together. Simply because we have acted rather under impulse than as the result of sober reflection. If when there is a difficulty threatening, as there will be—we know human things too well not to realize that there will be difficulties—if when these difficulties come we were to meet and say now what is the cause of complaint, if we were to understand one another, I am very sure that these difficulties, largely, at least, could be obviated."

Mr. Schwab said in part:

"My attitude upon the labor question is too well known to need any discussion here. But I did come here, as Bishop Potter well expresses it, to see the other side of the shield if I can. Any man who is as largely and as deeply interested in labor as I am must try to see the other side of the shield, to see the question of labor from the employers' as well as the employees' point of view. I am here with a mind open to conviction, with a mind to receive anything that is fair, with a mind to do that which is fair, to bring about harmony between capital and labor.

"It is a selfish motive in a way. I realize that the prosperity of the United States is going to advance more rapidly. It is bound to advance, at any rate. But it is going to advance much more rapidly when this happy solution has been reached.

"The decadence of trade in many of the old countries is due primarily to the attitude which labor has taken with reference to capital. It is the most important thing with reference to the loss of trade in Great Britain to-day. I think all economists writing on this subject will agree with that. I don't mean to say that employers have not been arbitrary and radical. They have. On the other hand, I think that labor has been just as arbitrary and radical. And it is to remedy and conciliate these differences that we ought to get together.

"There is one point that I want to impress upon you—that labor unions will never succeed, as trusts never succeeded in the attempt to restrict the output or attempt to put any restriction upon trade in general. Those great trusts that are formed in a business way to control the output of any commodity, to raise its price, they all have failed and all will fail. A trust will succeed where there are motives of consolidation for economy's sake and for regulating trade generally. And the laborer must take a similar position.

"Labor must not restrict the output. That is a fundamental principle. And I am sorry to say that every labor organization with which I have had experience in the past has had as its foundation the restriction of the output. It is that principle which is putting English commerce and English trade in the bad position they are to-day; and we owe it to America's greatness in commerce that these great business aggregations do not become trusts and that the labor leaders must not put them in a position where the labor union becomes a trust of time and output.

"I am opposed to labor organization as it is to-day organized. I am sorry I did not have Mr. Phillips and such gentlemen to deal with. I think that only good will come from a frank and naked discussion of the truth, and therefore I give you these views. I should not be opposed to organized labor if organized on correct principles. It is a mistaken idea that manufacturers are opposed to labor unions per se. They are opposed to them as they do exist, not to labor organizations who keep their contracts, not with labor organizations who will not restrict the output, not with labor organizations who have the good of the trade they represent at heart."

James Duncan, First Vice-President of the American Federation of Labor and Secretary of the Granite Cutters' Association, a member of the committee, is reported as saying: "Everyone of the labor leaders is thoroughly satisfied with what has been done and will urge that it be heartily supported by the ranks of organized labor. It is quite a mistake to suppose that labor is in a minority on the committee. Labor and capital are represented in that body by an equal number of men, 12 each. The remaining 12 members are neutral; they must not be classed as capitalists. Indeed, as a matter of fact many of them are already thought among employers to lean in their sympathies toward the side of labor. Take such men as Archbishop Ireland and Bishop Potter, who are



among these 12; nobody doubts but that they will be neutral. The neutrals will only use their good offices when the others fail to agree. A sub-committee of the whole might be appointed, say, to look after a certain strike, and it probably would consist of six members—two from labor, two from the employers, and two neutrals. If the former failed to agree, which is unlikely, then the latter, the neutrals, would use their influence to bring about a settlement. There is no question but all the labor leaders heartily favor this scheme."

#### Coal Handling at Lincoln Power Station—Boston Elevated Railway.

The following extracts are from matter recently published by the C. W. Hunt Co., New York, telling how coal is handled from ship to furnace by their apparatus at the Lincoln power station of the Boston Elevated Railway:

The building is 155 x 145 ft. in area. It is built of brick, with limestone trimmings, and has a tile roof. Although the eastern and western walls are of brick, it is expected that the building will be extended in these directions later. The brick chimney is 251 ft. high, with a circular flue 13 ft. in diameter. The pumps, condensers

on pivots, gravity keeping them in an upright position, no matter whether the track is horizontal, vertical or inclined. The conveyor is carried on wheels fitted with self-closing oil cups and oil reservoir, is electrically driven and is noiseless in operation. All shafting is ground on lead centers and runs in removable bronze bushings. All gears are machine cut and pressed on taper shafts. Careful provision is made for thorough oiling, and all parts are made to jigs, tools, and templates on the interchangeable system. The bearings, axles, links and the buckets are as accurate in workmanship and as durable in use as the corresponding parts of machine tools used in manufacturing establishments. The motion of the conveyor is obtained by pawls pushing the chain along, entirely avoiding the troubles of sprocket wheels. The lengthening of the chain, by wear of the links, which is a serious matter when sprocket wheels are used, is not noticeable when pawls are employed for driving. The pawls give a steadier motion than sprocket wheels, and permit the power to be applied at any point in the conveyor chain. The wear on the pawls is an insignificant amount, and as all the working bearings are of ample area and can be thoroughly oiled, the conveyor will work the same after years of use as when first started. A Hunt rotary filler is used on the lower line for feeding the coal and ashes into

Some of this stock was afterward sold, but a large amount has been held from that time to the present.

"About a year ago the Union Pacific Company bought the Huntington and other interests in the Northern Pacific and at the same time made an effort to buy the control of the Chicago, Burlington & Quincy. With these lines in the hands of the Union Pacific interests, both the Northern Pacific and Great Northern would be largely shut out of the States of Nebraska, Kansas, Missouri, South Dakota, Iowa, Illinois and Wisconsin, except by using other lines of railway, some of which were in the market for sale and might at any time pass under the control of or be combined with the Union Pacific interests. We then, with the Northern Pacific, made proposals to the directors of the Burlington to buy their entire property. When this transaction was about being closed, the people who represented the Union Pacific Company and who had previously tried to buy the Burlington, asked to be allowed to share with us in the purchase of that company; this proposal we refused, for the reason that it would defeat our object in buying the Burlington, and further it was against the laws of several States in which the longest mileage of the Burlington was located.

"At that time, against the opposition of the more Southern lines, both the Northern Pacific and Great Northern had put into effect a low colonization rate and were carrying daily thousands of people into the Northwest, many of whom were coming from Kansas and Nebraska along the lines of the Union Pacific. This movement was at its height in the month of April, and, after we had closed the purchase of the Burlington, the Union Pacific people undertook the boldest effort that ever was made in this country, and bought over \$60,000,000 of the stock of the Northern Pacific in the markets of Europe and the United States. I was in New York at the time, and after Messrs. Morgan & Co. were aware of the action of the Union Pacific people it was found that together we held about \$21,000,000 of Northern Pacific common stock, and inasmuch as the common stock by right of a contract made with the preferred stockholders when the company was reorganized and the stock issued, had the privilege of paying off the preferred stock at par on the first day of January of any year until 1917, Messrs. Morgan &

Co. then bought in London and New York about \$16,000,000 of the common stock of the Northern Pacific. At the same time the Union Pacific interests, having already so large an investment, bid the stock up until there was the largest stock corner ever known. The common stock in three or four days went up to \$1,000 per share.

"I explained to my friends how that with control of the Northern Pacific, the Union Pacific would control the entire Northwest and of the West from Mexico to the Canadian lines, except for the Great Northern. So great is the effort to get this control that one of my friends in London, who owned \$2,000,000 of Northern Pacific common, offered and refused \$14,000,000 for his stock. The result was that Messrs. Morgan & Co. and ourselves owned \$42,000,000 out of \$80,000,000 of the Northern Pacific common with the privilege of paying off the \$75,000,000 of Northern Pacific preferred. The Union Pacific people owned \$37,000,000 of the common and about \$42,000,000 of the preferred stock, which was a clear majority of all the stock of the Northern Pacific, and claimed the exclusive control of the Northern Pacific Railroad and through ownership of one-half the Burlington."

#### The Operation of the Scherzer Rolling Lift Bridge.

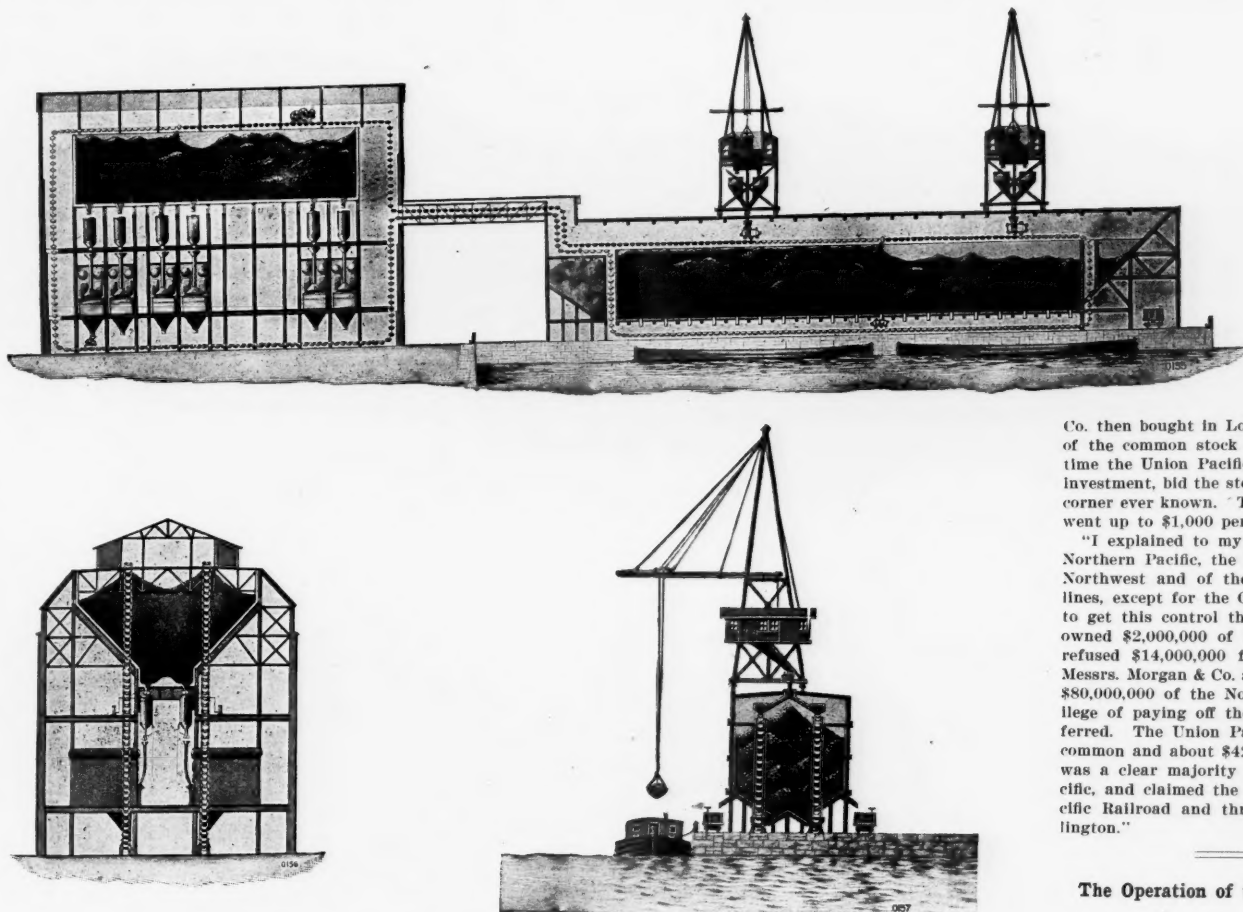
A little time ago the Department of Bridges of the City of New York let a contract for a Scherzer bridge. Some one opposed to the use of that style of bridge made the point that it could not be opened as frequently as the requirements of the situation demanded, say about 45 times a day. To settle this point the Commissioner asked information from a number of people using these bridges.

The Chief Engineer of the New York, New Haven & Hartford said that his company has in use a six-track Scherzer bridge over Fort Point Channel, Boston; the lift span is 114 ft. long and it is opened 16 times a day. It can be worked much quicker than a swing bridge and is opened in about 37 seconds. Another bridge of the same type is to be built on the New York Division at Bridgeport, over the Pequonnock River. This will be a four-track with two parallel double track lifts and a clear span of 80 ft.

The Chief Engineer of the Cleveland, Cincinnati, Chicago & St. Louis says that his company has a single track bridge with 125 ft. clear opening. This is opened from 30 to 50 times a day and has been in use 15 months with no delays. A double-track bridge with the same span was opened 741 times from Oct. 15 to Nov. 23.

The Chief Engineer of the Chicago Terminal Transfer Railroad mentions a bridge with a total span of 275 ft. The openings per day average about 150. The City of Chicago has three of these bridges in operation, the largest being 60 ft. wide with a clear waterway of 100 ft. The average openings are about 50 a day and there has been no more delay than with any other type of bridge. The Metropolitan Elevated of Chicago works a Scherzer bridge 40 to 50 times a day.

Probably nobody with information as to the design and performance of this type of bridge had any doubt of its efficiency, but these records from actual service are of some interest.



Coal Handling at Lincoln Power Station—Boston Elevated Railroad.

and all piping are placed below the level of the engine-room floor. The boiler room is at an elevation above the ground, and the coal is carried above this in a steel pocket. The capacity of this pocket is 3,000 tons of coal, and room for 5,000 tons more is reserved on the company's wharf, adjacent to the building. The total nominal horse-power of the boilers is 6,000, there being six batteries, each consisting of two 500 horse-power water-tube Babcock & Wilcox boilers. The 12 boilers are equipped with mechanical stokers and fuel economizers.

The engine room will contain three generating units. The two that are already installed each consists of a vertical cross-compound engine direct-coupled to a generator. The rated capacity of each generator is 2,700 kilowatts.

The Boston Elevated Railway Company made a thorough investigation to determine the system of coal handling that would best suit the conditions involved, and coal handling machinery manufactured by the C. W. Hunt Company was selected.

The accompanying illustrations show the general arrangement of the conveyor system as already installed in the power house, together with the proposed equipment for the coal pockets which are to be placed on a dock extension adjoining the power house. The equipment of coal handling machinery in the power house proper consists of two systems of Hunt standard noiseless gravity bucket conveyors, each about 500 ft. long and with a maximum lift of about 100 ft. This equipment, and the proposed installation in the coal pockets on the dock extension, comprise two complete duplicate conveyor systems, each about 1,300 ft. long.

This conveyor differs from the ordinary chain conveyors in many particulars. While it is usually called a conveyor and classed with this machinery, it is, in fact, a series of cars linked together, each having a body hung

the conveyor buckets. This filler measures a predetermined amount of material and deposits it in each passing bucket.

The coal pockets shown on the wharf are not yet built, but the arrangement indicated shows the proposed completed plant. Under this arrangement coal will be received from the barges and schooners at the dock, unloaded by means of movable steeple towers, cranked to a suitable size by a coal cracker and then stored in the coal pockets. From there it will be carried by the conveyor system to the upper part of the power house and stored, ready to come down through the weighing machines to the boilers below. It should be noted that coal and ashes can be handled simultaneously by the same conveyor. The ashes are carried to a pocket on the wharf. The cost per ton of coal handled, for maintenance, power and attendance is exceedingly small. The entire system for handling the coal, from the time of arrival at the wharf until the ashes are removed from the building is practically automatic and requires the minimum of attention.

#### Mr. Hill on the Northwestern Situation.

On the 21st Mr. Hill gave to the public the following statement of the events and situation in the matter of the Northern-Pacific-Great Northern-Union Pacific-Burlington arrangement:

"I feel called upon to make a conservative statement of just what has been done in the past and what will be done in the future.

"When the Northern Pacific failed and the banking house of J. P. Morgan & Co. reorganized it, myself and friends were holders of a large amount of that company's securities. After the reorganization was completed we bought about \$26,000,000 of Northern Pacific stock, both common and preferred.



## A Self Feeding Rail Bender.

Messrs. Fairbanks, Morse & Co. have recently put on the market an automatic rail bender and straightener which is shown in the engraving herewith. It will be noticed that it is self-feeding and thus saves time over those rail benders which require a new adjustment at every stroke. The cut shows its simplicity and the method of operation. After placing the forks over the rail the weight of the wedges will automatically set the ram up tightly, the loose block being interposed between it and the web of the rail. No further adjustment is required. It is now only necessary to move the lever back and forth, when the triangular wedges will feed down alternately and automatically at each stroke. When the curve desired has been made the rail can be released instantly. It can be used as well for straightening bent rails.

A gage or stop is attached to one of the wedges so that if the full limit of bend provided for is not desired it can be stopped at any point. If the gage is left set in the same position other rails can be given exactly the same curvature. No oil should ever be put on the wedges. This tool is made in sizes to take rails up to 100 lbs.

## Experiments On Spiral Springs.\*

BY C. H. BENJAMIN AND R. A. FRENCH.

The experiments under the direction of Mr. French, and the calculations are his. There is such scarcity of reliable data on spiral springs, their strength and elasticity, that it seems desirable to publish the results of these experiments. In the experiments an attempt has been made to determine the coefficient of torsional elasticity and the safe stress for different sizes of bar and different ratios of mean diameter of spring to diameter of bar. The following notation will be used:

$P$  = load in pounds.  
 $S$  = torsional stress in pounds per square inch.  
 $G$  = coefficient of torsional elasticity.  
 $d$  = mean diameter of spring in inches.  
 $D$  = diameter of bar in inches.  
 $L$  = length of spring in inches.  
 $L'$  = length of bar in inches.  
 $x$  = deflection in inches with load  $P$ .

Then, by the usual formulas for tension and compression springs:

$$P = \frac{S d^3}{2.55 D} \text{ and } x = \frac{L D S}{G d^4}$$

The springs tested were all made of tempered steel and were open-coil, or compression springs. The results shown in the table were in every case obtained by testing a number of springs made as nearly alike as possible, and using the average loads and deflections for computation. Every spring was first closed solid, coil to coil, several times in a hydraulic press, to remove all permanent set; then placed in a Riehle testing machine and tested for capacity and corresponding deflection.

Additional notation used in table:

$N$  = number of springs in group.  
 $O$  = outside diameter in inches.  
 $H$  = height before closing in inches.  
 $H'$  = free height in inches after producing set.  
 $H''$  = height in inches when closed solid.  
 $s = H - H'$  = permanent set in inches.  
 $x = H' - H''$  = total action in inches.

The value given for  $G$  in most hand books is 12,000,000. The larger values shown in the tables are doubtless due to the higher grade of steel used. The variation in values of  $G$  is probably due to differences in temper, although in some cases the chemical constituents of the steel may have varied slightly. The average value is found to be 14,700,000, which may be written 14,500,000 for convenience.

The proper stress is a more difficult thing to determine. A wide range of stresses was used in the springs experimented with. In each case the stress was that believed to be the best for the conditions under which the spring must work.

In some few cases, as in No. 18, it was necessary to use an abnormally high value to meet the conditions. This necessitated a special grade of steel, and great care in manufacture. Such a spring is not safe when subjected to sudden and heavy loads, or to rapid vibrations, as it would soon break under such treatment; if merely subjected to normal stress, it would last for years.

It will be noticed, by comparing columns  $S$ ,  $Y$ , and  $R$  of table, that  $Y$  varies with both  $S$  and  $R$  for the same diameter of bar; that is, if  $R$  is constant,  $S$  and  $Y$  increase together, and if  $S$  is constant,  $R$  and  $Y$  increase together. There are some exceptions to this rule noted, but it is believed to be generally correct. This being true, a spring with its mean diameter small, as compared with size of bar, will allow a higher stress with less proportionate set than one of a larger mean diameter. An ex-

cessive set means injury to the material, and liability of failure.

Springs of a small diameter may safely be subjected to a higher stress than those of a larger diameter, the size of bar being the same. The safe variation of  $S$  and  $R$  cannot yet be stated. There is an important limit which should be here mentioned. Springs having too small a diameter as compared with size of bar are subjected to so much internal stress in coiling as to weaken the steel. A spring, to give good service, should never have  $R$  less than 3.

The size of bar has much to do with the safe value of  $S$ ; the probable explanation is this: A large bar has to be heated to a higher temperature in working it, and in high carbon steel this may cause deterioration; when tempered, the bath does not affect it so uniformly, as may be seen by examining the fracture of a large bar.

The above facts must always be taken into consideration in designing a spring, whatever the grade of steel used. A safe value of  $S$  can be determined only by one having an accurate knowledge of the physical characteristics of the steel, the proportions of the spring, and the conditions of use.

For a good grade of steel the following values of  $S$  have been found safe under ordinary conditions of service, the value of  $G$  being taken as 14,500,000.

For bars below  $\frac{3}{8}$  in. in diameter:  
 $R=3$   $S=112,000$   
 $R=8$   $S=85,000$

For bars  $\frac{7}{16}$  to  $\frac{3}{4}$  in. in diameter:  
 $R=3$   $S=110,000$   
 $R=8$   $S=80,000$

For bars from  $\frac{1}{2}$  to  $1\frac{1}{4}$  in. in diameter:  
 $R=3$   $S=105,000$   
 $R=8$   $S=75,000$

For bars over  $1\frac{1}{4}$  in. in diam. a stress of more than 100,000 should not be used. Where a spring is subjected to sudden shocks a smaller value of  $S$  is necessary.

As has been noted, the springs referred to in this paper were all compression springs. Experience has shown that in close coil or extension springs the value of  $G$  is the same, but that the safe value of  $S$  is only about two-thirds that for a compression spring of the same dimensions.

TABLE OF RESULTS OF TESTS OF HELICAL SPRINGS.

Group.	Number of Springs.	Outside Diameter.	Mean Diameter.	Diameter of Bar.	Ratio $\frac{D}{d}$ .	Length of Bar.	Height before Closing.	Height after Closing.	Permanent Set $= H - H'$ .	Height when Closed.	Total Action $= H' - H''$ .	Ratio $\frac{S}{Y}$ .	Load to Close Spring.	Coefficient of Torsional Elasticity.	Torsional or Shearing Stress.
	N	O	D	d	R	L	H	H'	S	H''	x	Y	P	G	S
1	15	9.25	7.9375	1.3125	6.05	150	17.25	15.25	2	8.8175	6.432	.311	10,900	12,500,000	97,500
2	20	6.625	5.375	1.25	4.3	80	7.125	7	.125	5.9375	1.062	.117	6.375	14,400,000	44,700
3	12	6	4.75	1.25	3.8	67	7.875	7.5	.375	5.875	1.625	.23	16,600	16,150,000	103,000
4	6	5.25	4.125	1.125	3.67	89	10.75	10.125	.625	7.625	2.5	.25	13,800	13,400,000	102,000
5	20	4.75	3.625	1.125	3.23	75	9.875	9.375	.5	7.25	2.125	.235	17,000	12,500,000	110,000
6	40	7.75	6.625	1.125	5.9	100	7.875	7.625	.25	5.5	2.125	.117	4,850	15,800,000	57,500
7	36	5	3.9375	1.0625	3.7	61	7.5	6.9375	.562	5.375	1.567	.36	12,000	14,400,000	100,000
8	64	5.5	4.4375	1.0625	4.18	101	11.125	10.6875	.437	7.625	3.062	.142	12,000	15,100,000	113,000
9	24	4.375	3.3125	1.0625	3.1	48	6.5	6.125	.375	5.625	1.25	.333	14,800	13,700,000	104,000
10	6	6	5	1	5	84	8.625	8.125	.5	5.625	2.5	.2	8,000	17,100,000	102,000
11	20	4.5	3.5	1	3.5	79	9.875	9.4375	.437	7.25	2.187	.201	12,500	14,100,000	111,800
12	16	4.25	3.25	1	3.25	49	6.5	6.125	.375	4.875	1.25	.3	13,100	13,800,000	109,000
13	36	4.75	3.75	1	3.75	37	4.5	4.125	.375	3.25	.875	.43	12,000	18,100,000	114,400
14	35	4.187	3.25	.9375	3.48	50	6.5	6	.5	4.75	1.25	.40	10,500	14,700,000	106,000
15	800	4.5	3.625	.875	4.15	57	6.375	6	.375	4.4375	1.562	.24	6,250	13,100,000	86,500
16	8	3.75	2.875	.875	3.28	41	5.375	5	.375	4.125	1.875	.43	10,800	18,100,000	118,000
17	24	4	3.125	.875	3.58	60	7.375	7	.375	5.4375	1.562	.24	8,650	13,900,000	103,000
18	40	4	3.125	.875	3.58	51	6.5	6	.5	4.625	1.375	.364	12,000	18,900,000	143,000
19	24	3.375	2.625	.75	3.5	62	7.25	7	.25	5.655	1.345	.186	5,250	13,500,000	83,500
20	8	5.75	5	.75	6.07	172	17.625	16	1.625	8.4375	7.562	.212	2,850	13,100,000	86,500
21	8	4.5	3.75	.75	5	84	8.5	8	.5	5.5	2.5	.20	4,000	15,200,000	91,000
22	12	3.5	2.75	.75	3.67	53	6.375	6	.375	4.625	1.375	.273	6,950	16,200,000	115,000
23	4	4	3.25	.75	4.33	44.5	5.75	4.6875	1.0625	3.0625	1.625	.455	6,500	15,400,000	127,000
24	24	3.5	2.875	.625	4.6	68	7.375	7	.375	4.6875	2.312	.162	3,250	15,600,000	97,500
25	100	3.25	2.625	.625	4.2	37.5	4.375	4	.375	2.8125	1.187	.316	4,225	15,500,000	116,500
26	100	3.25	2.625	.625	4.2	43	4.75	4.5625	.187	3.375	1.187	.158	4,000	16,700,000	109,500
27	200	3.5	3	.5	6	108	9.75	9.625	.125	5.8125	3.812	.032	1,250	12,900,000	76,500

In the discussion attention was called to the fact that similar experiments were made on the Pennsylvania Railroad at Altoona 20 or more years ago, from which a similar corroboration of the Reuleaux formula was obtained.

## Texas Oil.

Doubtless the most complete and reliable data so far published on Texas oil and the Texas oil fields are contained in a bulletin recently compiled by the University of Texas Mineral Survey, and published by the University of Texas. Prof. W. B. Phillips is the Director of the Survey, which was organized under the provisions of an act of the State Legislature approved last March. The first bulletin is a compilation of data previously published together with such new data as have been collected by the Survey up to last July. The pamphlet is divided into chapters with the following headings: Historical sketch; nature and origin of petroleum; oil and gas-bearing formations; utilization of petroleum. The following notes are taken from this bulletin.

Official statistics show that up to and including 1895 but 361 barrels of petroleum were produced in the State of Texas. In 1899 the production was 669,013 barrels, and in 1900 836,039 barrels, chiefly through the opening of the Corsicana field. The first big well at Beaumont, the Lucas, came in Jan. 10 of this year, which alone has been estimated to have a capacity of 75,000 barrels a day, and this was the beginning of the rapid development of the Beaumont fields. The Survey refuses to make any estimate of the present capacity of the Beaumont wells, and holds that it will not be possible to get accurate figures until data are at hand on pipe runs and railroad

tankage. Some have calculated the yield at 782,500,000 barrels a year, but the Survey says in regard to this: "There are few actual facts upon which such an assertion can be predicted and it is not to be held that anything like so large an output can be reached."

The following table shows a comparison between the composition of crude petroleum from various parts of the world and Beaumont oil.

Composition of Crude Petroleum.

Description of Oil.	Carbon.	Hydrogen.	Oxygen.	Specific Gravity.
Heavy oil, West Virginia....	83.5	13.3	3.2	0.873
Light oil, West Virginia....	84.3	14.1	1.6	0.8412
Heavy oil, Pennsylvania....	84.9	13.7	1.04	0.886
Light oil, Pennsylvania....	82.0	14.8	3.2	0.816
Oil from Parma, Italy....	84.0	13.4	1.8	0.786
Oil from Hanover, Germany.	80.4	12.7	6.9	0.892
Oil from Galicia, Austria....	82.2	12.1	5.7	0.870
Light oil from Baku, Russia.	86.3	13.6	0.1	0.884
Heavy oil from Baku, Russia.	86.6	12.3	1.1	0.938
Oil from Java....	87.1	12.0	0.9	0.923
*Oil from Beaumont, Texas.	86.8	13.2	...	0.920

\*Fraction between 266 deg. and 275 deg. F. Fraction between 311 deg. and 320 deg. had nearly the same composition. Fraction between 374 deg. and 383 deg. had carbon 87.26 and hydrogen 12.54 per cent.

Analyses of crude Beaumont oil show a specific gravity of about 0.92 at 60 deg. F.; flash point at 110 deg. F. and a fire test of 180 deg. F. The oil shows no evidence of congealing at temperatures of 5 and 10 deg. F. below zero. The oil has an asphaltum base and a very disagreeable odor.

Various analyses of Beaumont oil are included in the bulletin from which is shown that its percentage of sulphur is much higher than in either Pennsylvania or Lima oils and the yield of illuminating oil much lower. While it seems improbable that such distillates as naphtha, benzene, kerosene, etc., can be recovered from Beaumont oil with profit, yet it is thought that lubricating oils of good quality and fuel oils will be made. The greatest use for the crude oil will probably be as fuel for locomotive and stationary boilers.

The heat values of the coals from Indian Territory, Arkansas, Alabama and New Mexico, with which the Beaumont oil is expected to compete, range from 13,500 to 12,000 B. T. U. for coal, with lignite at 9,900 B. T. U.

Tests of Beaumont crude oil show heat values from 17,000 to slightly over 20,000 B. T. U., 18,500 B. T. U. being about an average. On this basis a barrel of this crude oil, weighing 320 lbs. net, is equivalent to 438 lbs. of Alabama or McAlester coal, 493 lbs. of New Mexico coal and 598 lbs. of lignite. Conversely a ton (2,000 lbs.) of Alabama or McAlester coal is equivalent to 4.56 barrels of crude oil; a ton of New Mexico coal to 4.06 barrels and a ton of lignite to 3.34 barrels.

Besides the purposes mentioned it is thought that some of the distillates from Beaumont oil can be used to good advantage in oil engines and that a large part of the Corsicana oil is suitable for such use without distillation. It is also thought that this oil may be found useful as a top dressing for roads and streets.

## Feed Water and Steam Heater for Locomotives.

Mr. M. N. Forney has been granted patents (No. 688,402) on a feed water and steam heater for locomotives. The patents describe various arrangements in detail and there are 15 sheets illustrating these several designs. Those sufficiently interested in the subject are referred to the patent papers for a description. In general the feed water is heated in two stages. In what is called the "exhaust" heater, placed below the boiler extension, the water is first heated by passing through or around tubes which are in contact with a portion of the steam exhausted from the cylinders. From the "exhaust" heater the water goes to the "fire" heater, consisting of a series of water tubes built in an extension to the smoke arch. Before passing to the stack, the front end gases are made to circulate around the heater tubes. An alternate construction is to use a portion of the

\*Extracts from a paper presented at the recent meeting of the American Society of Mechanical Engineers.



"fire" heater to superheat the steam before it goes to the cylinders, or on cross-compound locomotives to reheat the steam on its way to the low-pressure cylinder. The whole thing is interesting as a study by Mr. Forney, and has been worked out with great pains.

Pipe Covering Tests.\*

BY GEO. H. BARRUS.

These pipe covering tests were planned with the object of ascertaining the efficiency, both comparatively and absolutely, of some of the leading coverings as ordinarily manufactured, sold and applied. The main object so far as the getting of the principal data is concerned is to properly secure and measure the water of condensation of the steam in the pipes. Precautions must be taken first to insure a supply of steam to the pipes free from water at the start; in other words, dry steam; second, suitable inclination or pitch of the pipes to insure the drainage of all the water formed by condensation to the drip-ends or the points where it is discharged into the collecting casks; third, the thorough venting of the drip-ends of the pipes to prevent the collection of air in the interior, and fourth, the proper collection and measurement of all the water discharged.

The coverings were bought in open market, and I believe them to be what they were by this method of purchase intended to be, samples of the coverings which are ordinarily supplied by the various manufacturers in the ordinary course of business. They were applied by workmen familiar with the application of pipe coverings, under intelligent supervision, and, in my opinion, well butted, pointed and secured. During the progress of the tests they have been frequently pointed up with cement where the joints, through continued service, have become defective, the same as would be done by the repair force having the care of a steam plant in commercial service which is well kept up. Before the conclusion of the tests opportunity was given the representatives of each covering to visit the plant, examine his goods, criticize their application and where defective correct the defects. It may be said here that where such defects have been found and corrected no appreciable improvement was produced, thus showing that the coverings were already well applied.

The lowest rate of condensation obtained on any of the two-inch coverings of the 80-lb. section has been a total for the entire pipe of 13.46 lbs. per hour, and the highest, 15.14 lbs. The lowest on any of the 2-in. coverings of the 150-lb. section has been 10.47 lbs. per hour, and the highest, 14.00 lbs. per hour. The lowest on any of the 10-in. coverings is 10.67 lbs. per hour total for the entire pipe, and the highest, 15.93 lbs. All these figures apply to the average rate for a period of 7 or 7½ hours continuous run. The minimum and maximum rates for each of the coverings tested are given in the appended table, together with the condensation of the bare pipes.

ORDER OF EFFICIENCY.

2-in. Coverings—80 lbs. Pressure:			
1. Johns' Asbestocel.			
2. New York Air Cell.			
3. Carey's Moulded.			
4. Johns' Moulded.			
5. Gast's Ambler Air Cell.			
2-in. Coverings—150 lbs. Pressure:			
1. Johns' Asbestos-Sponge Hair Felt, 3 ply.			
2. Johns' Asbestos-Sponge Hair Felt, 2 ply.			
3. Asbestos-Sponge Felted (Sectional).			
4. K. & M. Magnesia (85 per cent. Carb. of Magnesia).			
5. Asbestos Fire Felt (Navy Brand).			
10-in. Coverings—150 lbs. Pressure:			
1. Johns' Asbestos-Sponge Felted.			
2. K. & M. Magnesia (85 per cent. Carb. of Magnesia).			
3. Asbestos Fire Felt (Navy Brand).			
4. Watson's Imperial.			
MINIMUM AND MAXIMUM RATES OF CONDENSATION PER HOUR FOR EACH OF THE COVERINGS TESTED.			
2-in. Covering, 80 lbs. Pressure. Length of Test Pipes 100 ft.			
	Min.	Max.	
Johns' Asbestocel	13.46	14.07	
New York Air Cell	13.88	14.14	
Carey's Moulded	14.18	15.00	
Johns' Moulded	14.15	15.07	
Gast's Ambler Air Cell	14.60	15.14	
2-in. Coverings, 150 lbs. Pressure. Length of Test Pipes 100 ft.			
	Min.	Max.	
Johns' Asbestos-Sponge Hair Felt, 3 ply.	10.47	10.93	
Johns' Asbestos-Sponge Hair Felt, 2 ply.	11.21	11.20	
Asbestos-Sponge Felted (Sectional)	11.20	11.57	
K. & M. Magnesia (85 per cent. Carb. of Magnesia)	11.64	12.20	
Asbestos Fire Felt (Navy Brand)	13.18	14.00	
10-in. Coverings, 150 lbs. Pressure. Length of Test Pipes 35 ft.			
	Min.	Max.	
Johns' Asbestos-Sponge Felted	10.67	11.07	
K. & M. Magnesia (85 per cent. Carb. of Magnesia)	13.00	13.64	
Asbestos Fire Felt (Navy Brand)	14.00	14.64	
Watson's Imperial	15.79	15.93	
Bare Pipes.			
	Min.	Max.	
2-in., 80 lbs. pressure	55.75	60.30	
2-in., 150 lbs. pressure	71.78	72.20	
10-in., 150 lbs. pressure	105.9	112.	
Temperature air of room (approx.)	50.	75.	

I. C. C. Income Report to June 30, 1901.

The preliminary report on the income account of railroads in the United States for the year ending June 30, 1901, prepared by the statistician to the Interstate Commerce Commission, has just been finished. It includes returns of companies operating 192,193 miles of line, or nearly all that will be included in the final report for the year.

Passenger earnings were \$426,909,210; freight, \$1,114,740,770; total, \$1,578,164,205, or \$8,211 per mile. The gross earnings shown in the final report for 1900 were

\*From a paper read Nov. 12 at the Manhattan Railway Power House.

\$1,487,044,814. In the present report operating expenses amount to \$1,023,156,281, or \$5,323 per mile of line, making net earnings \$555,007,924, or \$35,577,218 in excess of the net earnings during the fiscal year 1900. The total income of these roads, including \$65,271,244 miscellaneous, was \$620,279,168. Deductions from income, not including dividends, were \$421,625,796. This includes \$47,041,214 taxes. The amount of dividends declared during the year was \$121,108,637. The amount of dividends shown for the same roads in 1900 was \$108,210,652, or nearly \$13,000,000 less. As the preliminary report is confined to returns of operating roads, the dividends shown therein do not represent the entire amount of dividends declared on the stocks of all the railroads, because the dividends of leased lines are paid from the rentals they receive from the operating lines. The dividends paid by the two classes of companies annually includes about \$30,000,000 paid on the part of leased lines

Floods, Frost and Coal Famines.

The floods in Pennsylvania, New York and elsewhere of Dec. 14 and 15 were much more severe than appeared from the first reports. In the valley of the Lehigh River, Pennsylvania, and in Central New York the waters rose in many places to the greatest height on record, and the main lines of important railroads were blocked for several days.

A despatch from Wilkesbarre, Pa., on the 17th, estimated that the losses on the Lehigh Valley Railroad would amount to over a million dollars. Washouts were frequent for a hundred miles. The Bowman's Creek branch and the Bear Creek branch of the Lehigh Valley were very badly damaged. The North Fair Haven Division was not restored for more than a week. A number of small bridges were destroyed, and the large bridge at Penn Haven Junction was so damaged as to be useless. The Central of New Jersey was badly damaged in the same territory. These two lines run through the same narrow valley, on opposite sides of the river, and the Central track is generally lower than that of the Lehigh Valley. The loss to the Central in this district was estimated at \$500,000. The Pennsylvania Railroad and the Delaware, Lackawanna & Western also suffered severely in the same region, and the losses to the railroads in Luzerne County were expected to aggregate a million dollars. From Auburn, N. Y., it was reported that the Lehigh Valley had lost 20 bridges, this referring, apparently, to the territory near that city. It seems that most of these bridges were very small ones.

On the Pennsylvania Railroad, near Newberry, Pa., a freight train broke through an iron bridge, which appears to have been weakened by the flood, and three trainmen were killed; an engine and nine cars were submerged.

At Scranton, Pa., blockades of two and three days were reported on all of the lines. The Delaware, Lackawanna & Western was flooded and impassable at Delaware Water Gap for over 24 hours; the Erie Railroad east of Port Jervis was blockaded for about the same time.

The New York Central was flooded west of Utica, and there were frequent washouts for many miles; and the main line was impassable for 24 hours or more; but the West Shore appears to have been kept open. Before the flood receded the weather turned cold and switches were so frozen as to be immovable. The wire and rod connections of interlocked switches and signals were embedded in ice, requiring great labor to get them in working order. Loss of bridges and other disasters were reported from many towns in the region of Utica. The Central lines north of Utica and Rome were very badly crippled; and the Mohawk & Malone was closed for several days. Between Herkimer and Remsen the blockade lasted about a week.

There were serious washouts on the Maine Central between Gardiner and Lewiston, blocking the road for one day or more. At Clinton an important steel bridge was destroyed. For several days an old small steamboat on the Penobscot River formed the most important passenger link between Portland and Bangor.

At Trenton, N. J., the flood in the Delaware River submerged a part of the town and made the line of the Pennsylvania Railroad to Burlington impassable. The losses in and near Trenton were estimated at \$600,000.

At Pittsburgh, Pa., the high water in the rivers was reported on the 17th as having caused a million dollars damage.

In the anthracite coal region many mines were flooded so that work had to be suspended for several days.

On Dec. 14, or about two days before these floods in the North, a number of bridges were reported as washed away by floods in Tennessee and West Virginia. A large bridge of the Tennessee Central, at Fall Creek, Tenn., was washed away. The Virginia & Southwestern Railway lost bridges at three different places. The Chesapeake & Ohio lost two large bridges, one of them at Lowell, W. Va.

On Dec. 18 and 19 the Union Pacific was blockaded throughout Wyoming and also in Nebraska by a snowstorm, and the rotary snowplows could not be run over the road frequently enough to keep it open. One rotary plow, pushed by two large engines, ran into the rear of a train of empty passenger cars, and a caboose and nine passenger cars were destroyed by fire.

Traffic at the Union Station in St. Louis, Mo., was much delayed on Dec. 20 by frost, the switches having been frozen so as to be immovable.

In connection with the cold weather the floods and the shortage of freight cars, serious coal famines are re-

ported from Chicago, Ill.; Cleveland, Springfield, and other cities in Ohio, and other places. In Chicago large office buildings and factories were absolutely unable to keep their fires running. The railroads confiscated many carloads of coal for their own use.

Suburban Passenger Fares on Standard and Street Railroads in Massachusetts.

The Railroad Commissioners of Massachusetts have issued their decision on the petition of residents of Roslindale for a reduction of fare on the New York, New Haven & Hartford Railroad. The lowest fare now in force between the South Terminal Station (Boston) and Roslindale is furnished through a twenty-five-trip ticket at the rate of 6.8 cents a single ride. The distance is 6.5 miles. Comparison shows this to be among the lowest charges made upon steam railroads, within or without the suburban district, for similar service. The case is, therefore, unlike that in deciding which the Board recently recommended a reduction of fare between the South Terminal Station and Bird and Dudley streets. The fare there in force was shown to be clearly in excess of the usual rate, while here it is below the average charge.

Suburban rates compared one with another are out of proportion, and, as stated in the Annual Report of the Board for 1900, need readjustment, particularly upon certain systems made up of roads formerly under separate management. No opinion need now be expressed as to the exact changes which ought to be made, or as to the standard which ought to be adopted; for the question before us is not a general revision of suburban rates, or an examination of any particular rate as affected by such revision. The petitioners present a single, definite request: they desire a five-cent fare upon a steam railroad for a distance of six and a half miles. It is admitted that no such low rate exists to-day elsewhere in this or other States. The limited season ticket is, of course, excluded in this statement, as it might well be in certain tables of rates where it makes mischief for those who are prone to rely upon general averages.

In effect the claim of the petitioners is that we ought to recommend that steam railroads should be required by law to enter into competition with street railways in the matter of fares. We must decline to do this. In view of the difference between the steam railroad and the street railway, in the cost of construction and maintenance, competition between them in short distance travel must as yet be of an experimental nature. As such it is a question for the business management of the companies.

It is apparent that traffic in the suburban district still continues to be increasingly diverted to the street railway. There were fewer passengers carried during the year ending June 30, 1901, upon the railroads which make returns to the Board than during the previous year, while the passenger mileage during this period has been largely increased.

How best to meet this decline in suburban business is necessarily receiving the attention of men of ability and experience in railroad operation. If we were confident that a suburban line, electrically equipped, could be successfully operated with a low fare to meet the street railway rate, we would have no right, particularly at this experimental stage of the development of electricity as a motive power upon railroads, to give such opinion the force of a requirement. We must, therefore, decline to recommend that the steam railroad be compelled to adopt a five-cent fare between the South Terminal Station and Roslindale.

We think we ought to add that in our opinion the real disadvantage under which the people of Roslindale suffer is the lack of the street railway accommodation usually enjoyed by those similarly situated. While with one exception all other parts of Boston are connected with a five-cent fare, the people of Roslindale have to pay two such fares in traveling to and from the other parts of the city; one to the West Roxbury & Roslindale Company, and one to the Boston Elevated Company.

Through consolidation and voluntary agreement between companies, it has come to be the general rule throughout the State that within city or town limits there should be a five-cent fare. There would seem to be no good reason why some equitable arrangement could not be brought about between the companies interested which would give to this community the street railway facilities of which it stands in need.

Foreign Railroad Notes.

Although the Russian railroad system included only 26,550 miles in 1898, it reported the goodly (?) or respectable (?) number of 7,161 accidents in operation, by which some one was killed or injured. Our own house is so brittle that we shall not venture to throw any stones.

The French are building the first section of their railroad in Madagascar, which will extend 180 miles inland from an inlet on the east coast. The road is of meter gage, and has 44-lb. rails resting on iron sleepers laid at the rate of 2,000 per mile. The sharpest curve is of 164-ft. radius. The rolling stock, cars as well as locomotives, has trucks. The appropriation for the section now under construction is 27,000,000 francs; but considerable extensions are designed, which will be undertaken when this first section has developed a considerable traffic.





ESTABLISHED IN APRIL, 1856.  
PUBLISHED EVERY FRIDAY  
At 32 Park Place, New York.

#### EDITORIAL ANNOUNCEMENTS.

**CONTRIBUTIONS**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**ADVERTISEMENTS**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

#### Railroad Gazette Index for 1901.

The annual Index, which heretofore has been issued with the last number of the *Railroad Gazette* of each year, will be issued with the first number in January. Those whose subscriptions expire with the last number in December may get a copy of the Index by addressing the publishers.

During the year 1901 the various car building works in the United States will have built, altogether, 144,267 cars of all kinds, the largest output for any one year, and 20,161 more than in 1900. These figures, of course, do not include cars built by railroads at their own shops. Of the 144,267 cars, 132,591 are freight, 1,949 passenger and 4,755 street cars for use in this country; and 4,359 freight, 106 passenger and 507 street cars for export. The figures for passenger cars include 202, and for street cars a few, for elevated service. Last year the total output of these works was 124,106 cars, as follows: 113,070 freight, 1,515 passenger, and 6,091 street cars for use here; and 2,561 freight, 121 passenger and 784 street cars for export. Most of the figures for both years are official, and in the absence of direct information we have estimated carefully from data which makes it certain our totals are not far from correct. In analyzing the returns it will be seen that a large proportion of the increase over last year is in freight cars, while the output of street cars is less. The primary reason for the latter is, naturally, the lack of demand by the street railroads; but some of the builders of street cars have been kept busy on heavy equipment for suburban electric and elevated service, off-setting the decrease in orders for smaller cars. Of the 136,950 cars built for freight service, 28,143 were either all steel or had steel underframes. We do not know the exact proportion of each; but it is safe to say that nearly four-fifths are of steel throughout. Last year the totals were 14,464 all steel and 4,140 with steel underframes only. About 1,000 of the steel cars built in 1901 were sent abroad.

That tradesunionism in England has gone mad is common knowledge; but examples of the results of the spread of the peculiar methods of the leaders are not uninteresting to our own people, and we note two items which we find in recent London papers. A petition was recently presented to the Board of Trade by the London County Council asking for four new suburban trains on the North London Railway, to be run between 3 and 5 o'clock in the morning, which petition was said to have the support of 857 workmen. But the railroad company, after getting 159 of the names of the alleged petitioners and making inquiries, found that 100 of them could not be traced; that in 32 cases the persons were dead, or had removed, or the street number could not be found, and that only 27 were correct. Col. Yorke, who had charge of the case on behalf of the Board

of Trade, on learning this state of facts, immediately discontinued the inquiry. The representative of the County Council admitted that the officers of the Council had been grossly deceived. Of course, the trades unions concerned in this case will not have to pay the costs incurred by the Council and by the railroad company. An article in the *Times*, showing some of the mischievous results of what is done on behalf of trades unions, gives interesting details of how the trade union axiom that a workman must be careful not only to refrain from working too long but also from working too hard, has affected the railroad field. The flower of this idea is only found in shops where mechanical work is done by men connected with old and thoroughly organized trade unions; where, in some cases, a man who could easily finish 50 brass castings in a day, is bound by his agreement to finish only 8; but railroad employees appear to be good learners in this school. One energetic workman, while loading coal as fast as he could, was told by his mates that he "mustn't work like that"; but he still kept on, and got a black eye. A station master who asked for more help at his station was told that he had as many porters as formerly, and that the traffic had not grown; but he replied that "the men won't work as they used to." It appears that signalmen and other railroad employees who have had their hours reduced, now devote their additional leisure to shoe-making, gardening, plastering, and other work which, of course, may interfere with the prospects of a livelihood formerly enjoyed by men who depend on these occupations for their daily bread. This last item suggests a highly interesting query in the American sociological field: What use is made of the extra hour or two, daily, which thousands of artisans, mechanics and laborers now enjoy, over and above the time which was at their disposal a few years ago?

In Mr. Schwab's little speech at the recent industrial peace conference in New York City he got right at the heart of the matter in a simple and candid way. In fact, his speech was the most useful one delivered at the meetings, for it cleared away the rubbish. He said that he could not work with the trades unions so long as a fundamental principle with them was to restrict the output of a workman; but that with all of them this is a fundamental principle. Bishop Potter, Archbishop Ireland and Mr. Hanna all uttered admirable sentiments, and Mr. Hanna spoke from actual and extensive experience; but, after all, none of them touched the heart of the matter. The speeches of the professional labor leaders were not encouraging. They thrashed over the old generalities and revealed their willful blindness to the facts. They showed no sign of growth in knowledge or thought. So long as the unions keep fetters on the intelligence, enterprise and thrift of the individual they are at war with the laws which are at the root of human progress, and so long they are a threat to society. It would be a pretty good plan to send a few deputations of intelligent workmen to England and give them a chance to see with their own eyes the logical working out of the restrictive idea of trade unionism. Perhaps Mr. Schwab and Mr. Hanna, and a few other very rich men, may think it worth while to raise a little fund to carry out such a scheme. But the new organization of conciliators is a strong one and the general committee includes many wise and experienced men, and we may reasonably hope that they will start some plans that will lead slowly but steadily to real and lasting improvement. It is a good thing to get the practical men interested and to get them to thinking and working along definite lines.

#### What Can Be Done With the Interstate Commerce Law?

The opening of the Legislative season at Washington and the prospective opening of the same at Albany and other state capitals is marked by renewed discussion of the "railroad problem;" and the Governor of Minnesota proposes to force a legislative season, without regard to whether the season is yet regularly due, in that latitude, or not. The discussion began with the complaint of the Western millers—those (outside of Minneapolis) who make flour for export—who took their grievance to the White House, and got the President to speak of it in his message to Congress.

Interest was intensified by the remarkable confessions of traffic managers before the Interstate Commerce Commission at Chicago in November that secret rate-cutting and secret "conspiracy" to divide traffic, both unlawful, were everyday matters among traffic men—that is, other traffic men. These confessions told nothing new about rate cutting, for

there was ample circumstantial evidence of the rate cutting before; and indeed, one prominent railroad president made a similar confession a year or two ago, though it was to a reporter, not to government officials. The Chicago revelations concerning agreements or proposed agreements to divide traffic were more in the nature of news; but the news is not very weighty, for the reason that the agreements do not seem to have accomplished anything. As a whole, however, the confessions, concurred in by two or more prominent freight officers, and evidently referring to acts within their own knowledge, if not within their own offices, produced a considerable impression on the public.

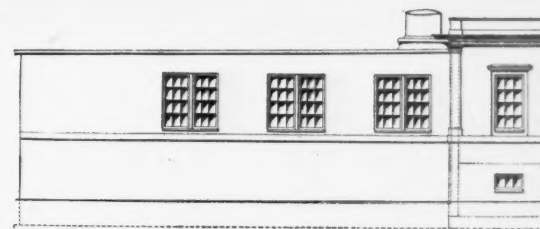
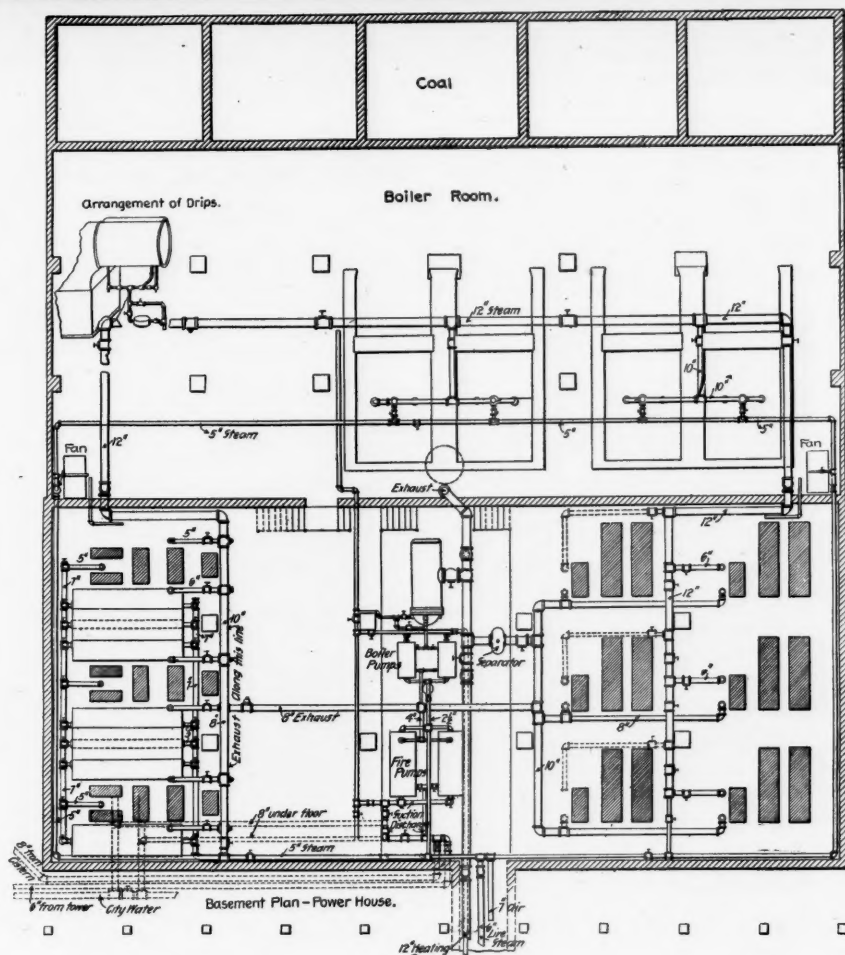
Coincident with these developments, grain dealers in New York are asking Governor Odell to recommend to the Legislature that the state railroad commission be empowered to make and enforce rates; and the people of Chattanooga, Tenn., say that they are going to the Supreme Court with their long pending case against the railroads for refusing to bring freight from New York as cheaply as the Louisville & Nashville takes it to Nashville. Governor Van Sant, of Minnesota, has no rate grievance at present, but he talks of a special session of the Legislature to take precautions against possible acts of extortion by the Great Northern and the Northern Pacific, in consequence of the community of ownership now existing between these two companies. These and other local agitations may have little or no important connection with the broad transportation question as it will come before Congress, but they will have their influence in arousing people's interest in what Congress is doing.

The President's reference to the subject was made up wholly of platitudes. The obvious reason why he did not make specific recommendations is that, seeing the exceeding difficulty of the problem, he had to postpone its consideration, or leave it to men better acquainted with its technical intricacies. It is now given out that Chairman Knapp, having conferred with the President, will draft a bill which, apparently, is expected to be a condensed and easily comprehensible resumé of the Cullom bill. Judge Knapp is, probably, the most conservative and the best informed of the men who are interested on what may be called the Government side of this question, and therefore we may expect a bill of as reasonable character as can be made which shall suit any considerable portion of the shippers who are alleged to want a change in the law.

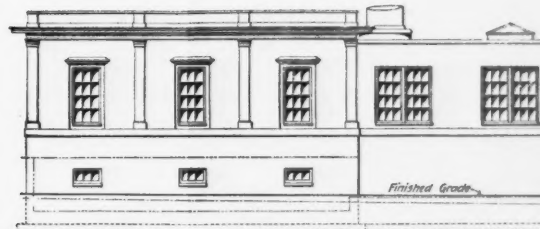
It is difficult to see wherein the main elements of the situation are any different, from the Legislative standpoint, from what they were one year or three years ago. The composition of Congress has changed somewhat, and as the decision of questions of this kind hinges so largely on personal predilections and other considerations that no one can fathom, it would be rash to predict or even to guess what the outcome will be. Congress is not so preoccupied with political matters as it has been for the last two sessions, and that is in favor of action. There should be no difficulty in getting the railroad question up for discussion if anybody has really something to say. The position of the railroads does not at present show signs of any material change from a year ago. The "community of interest" idea has already checked the rate-cutting spirit somewhat, and it is likely to have still more effect in the same direction; but thus far it does not seem to have touched the worst spots. On export freight, where competition is keenest and the supposed excuse for violation of the law is the greatest; and on large shipments, where agents have the strongest feeling that their employer's interest or their own reputation is at stake, individual interest still rules. This shows that there is not as yet any fear on the part of the railroads that the law will be enforced or any feeling that its restrictions are just; and, therefore, there is no assurance that the secret rates which are heard of by the reporters are the only ones in existence.

It does not appear that the public has its wishes any more clearly defined than they were a year ago. The Minneapolis flour shippers assert that the millers who are asking for a rate-making Commission are not working in the public interest. At the convention held in St. Louis a year ago, to promote the Cullom bill, there were strong protests by merchants who asserted that it would be highly dangerous to have all railroad rates made by a body of government traffic managers, sitting at Washington, or by their subordinates. Probably these merchants feel the same way now. The Chicago revelations last month produced a profound impression, but they brought out no new remedial suggestions. Everybody deplored the situation, but nobody could say what to do about it. President Roosevelt, in avoid-

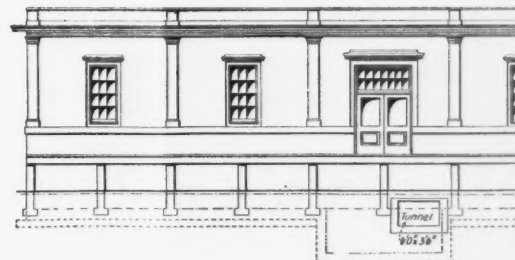




West Elevation.

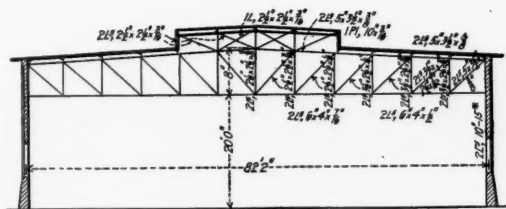


East Elevation.

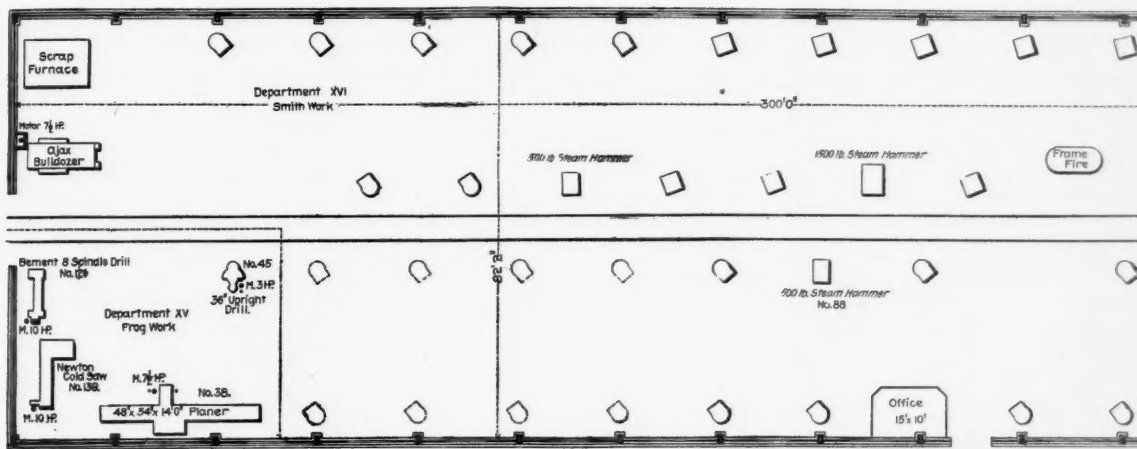


South Elevation.

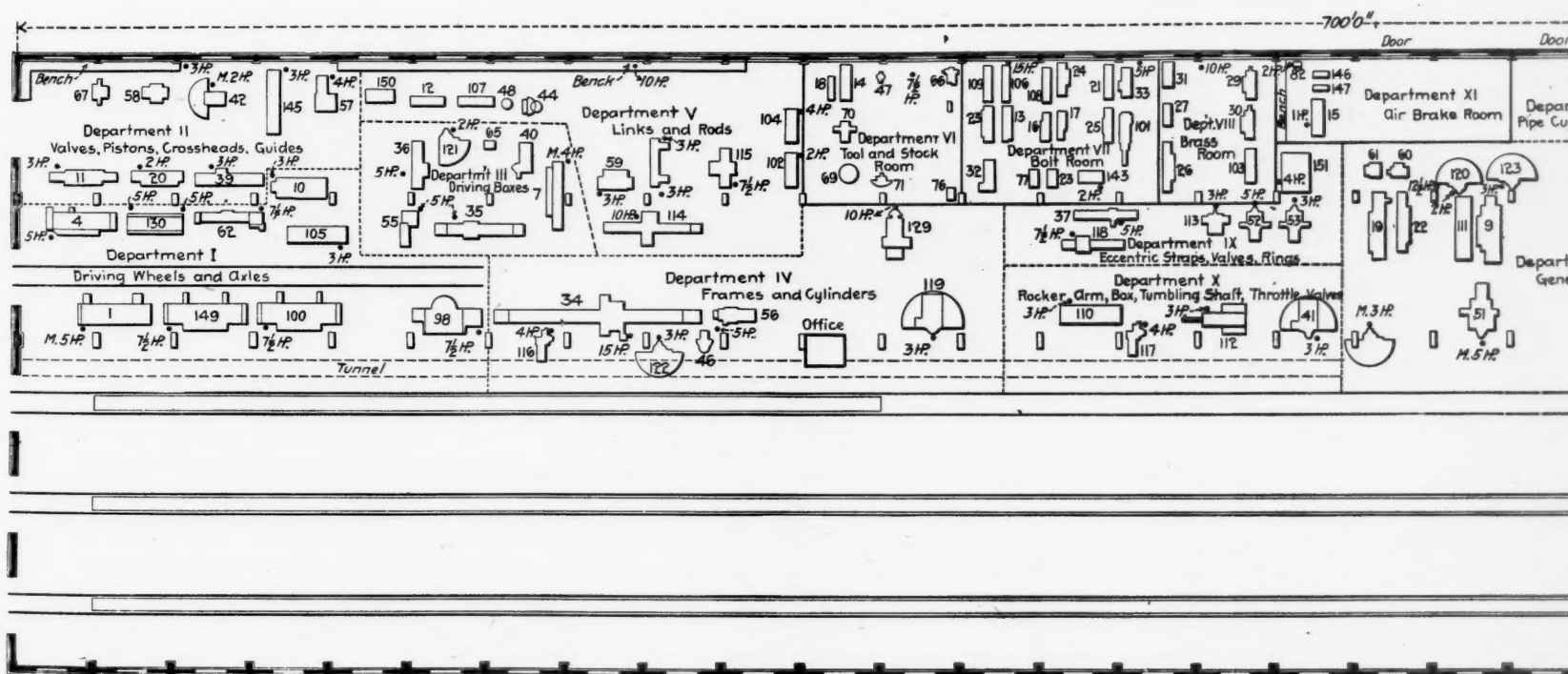
Power House—Piping Plans, Elevations, and



Transverse Section—Blacksmith Shop.



Blacksmith Shop Plan.

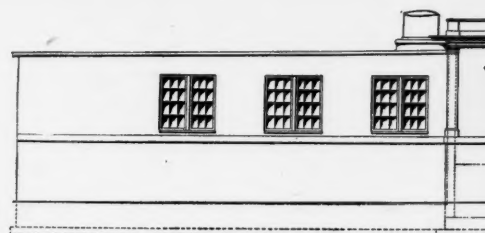
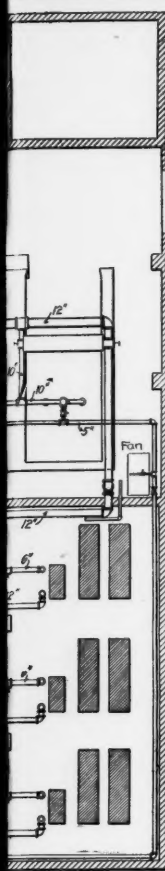


General Plan of Machine, Erecting and Repairing Shop.

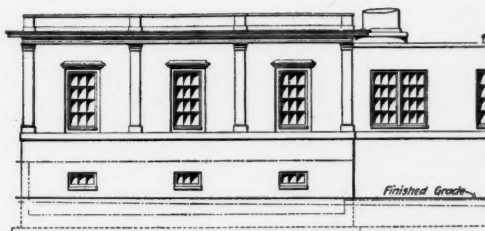
MR. GEORGE HILL, M. Am. Soc. C. E.,  
Designing and Constructing Engineer.

NEW YARDS AND SHOPS OF THE CENTRAL RAILROAD OF

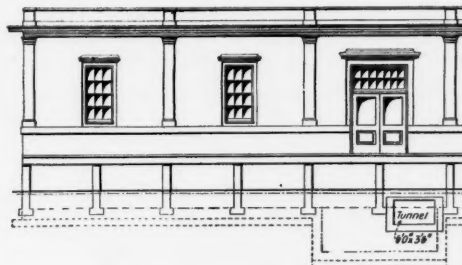




West Elevation.

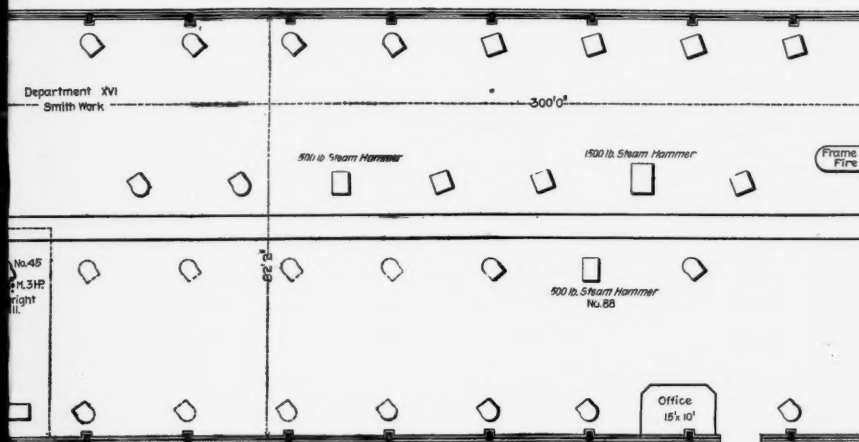


East Elevation.

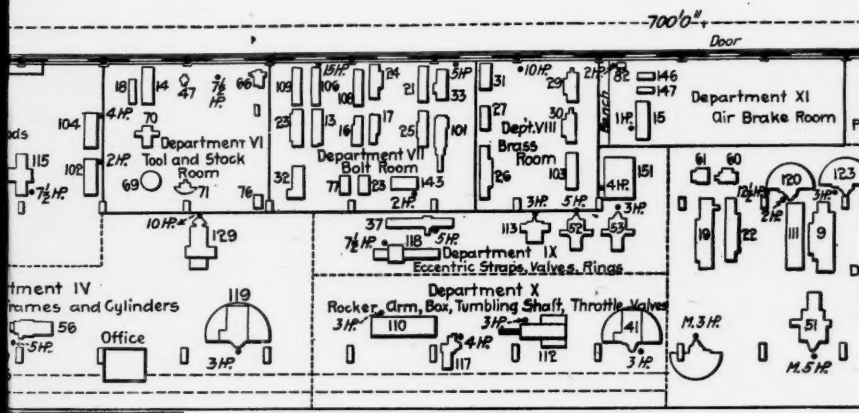


South Elevation.

Power House—Piping Plans, Elevation



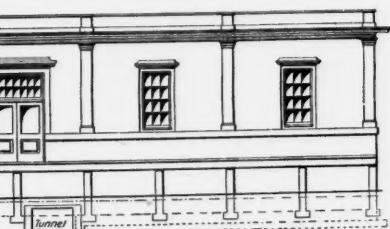
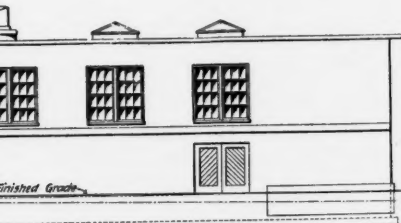
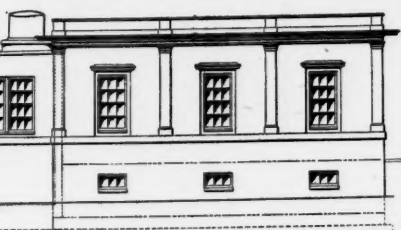
Blacksmith Shop Plan.



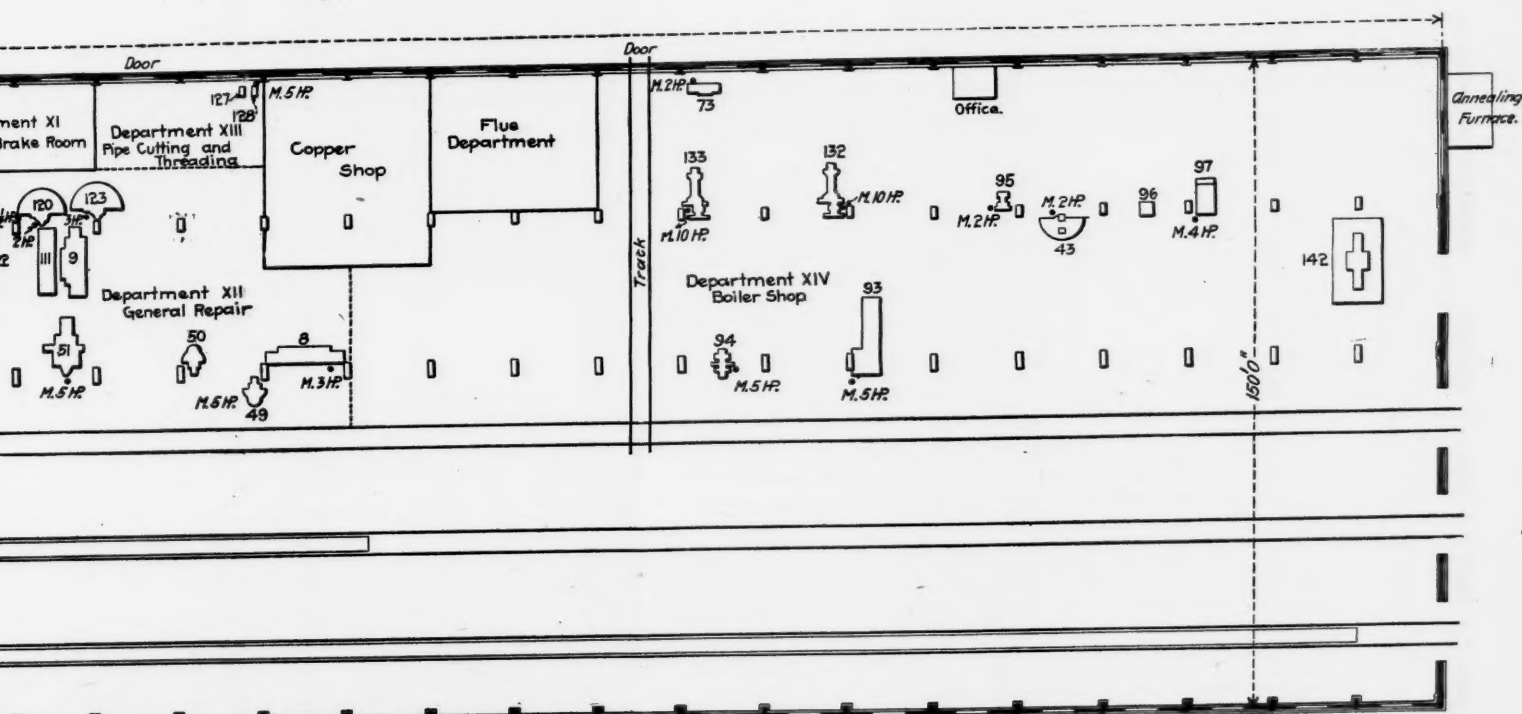
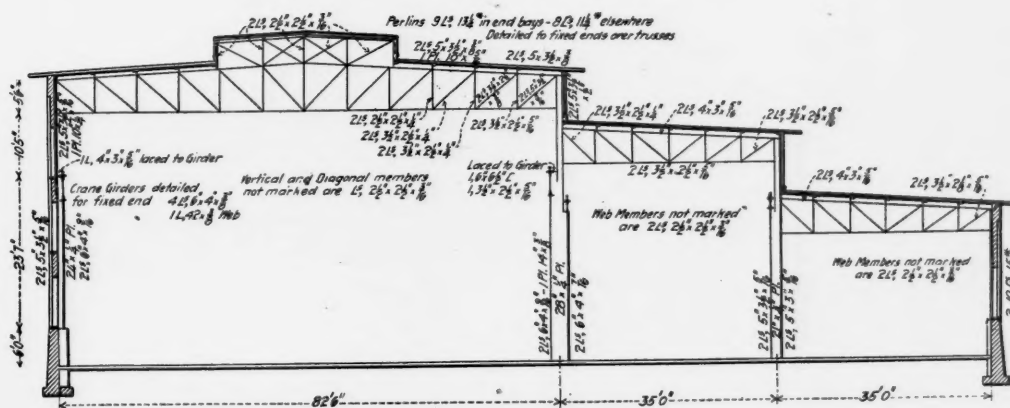
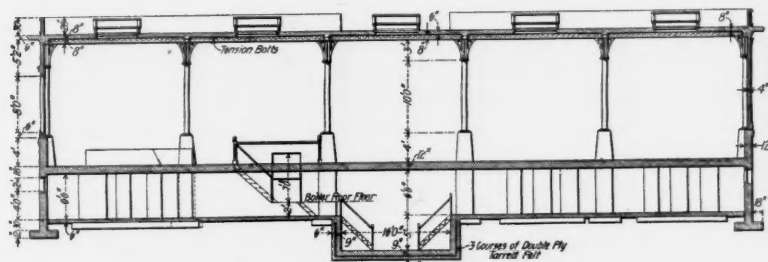
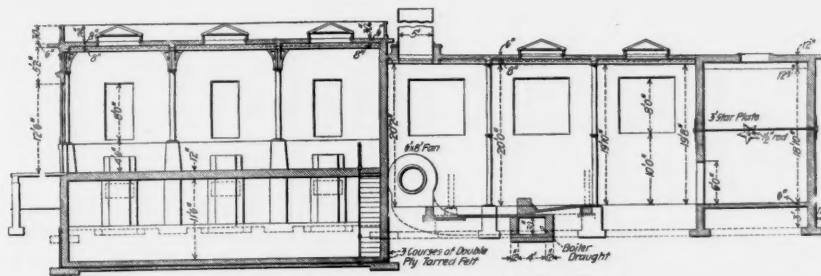
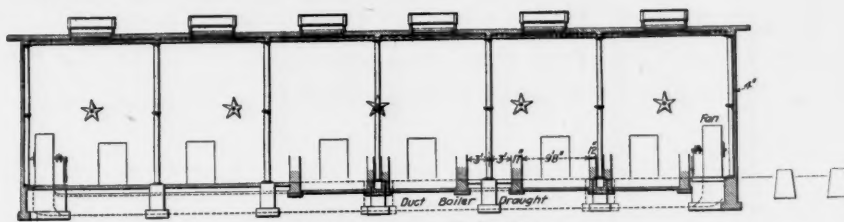
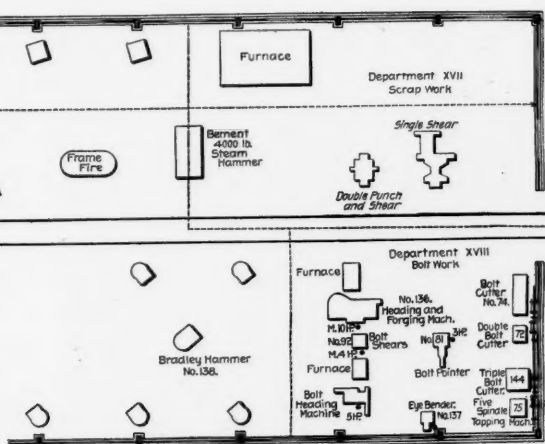
General Plan of Machine, Erecting a

NEW YARDS AND SHOPS OF THE CENTRAL RAILROAD





*Elevation.*  
**Elevations, and Sections.**



### Refrigerating and Boiler Shops.

AL RAILROAD OF NEW JERSEY—ELIZABETH, N. J.

MR. J. O. OSGOOD, *Chief Engineer.*  
MR. WILLIAM MCINTOSH, *Supt. of Motive Power.*  
MR. G. W. WILDIN, *Mechanical Engineer.*







ing a discussion of the subject on its merits, simply reflected the feeling of the general public.

The rate problem, from a legal and technical point of view, is as hard as ever. As was said by the St. Louis merchant, just mentioned, the angel Gabriel could not grant what clamoring cities are demanding, without at the same time discriminating against other cities. Railroad traffic managers may sometimes, at long intervals, use poor judgment (while meaning well) or exercise unenlightened selfishness or possibly they may even do worse; but these facts alone do not condemn our present judicial machinery. Rate regulating is rate-making. The repeal of the fifth section and the legalization of pooling would give an opportunity for some interesting experiments, for the pools that were tried before 1887 were not enforceable at law; but no one expects pools to cure the worst evils, although they might be useful as tentative measures. Amending the Interstate Commerce law will not, of itself, remove the shackles that now bind the traffic manager, for the Sherman Anti-trust law is his worst hindrance at present. But for that law the present dispute among the Chicago-St. Paul roads concerning the speed of passenger trains might possibly be settled by a pool of passengers, for such pools are not specifically forbidden.

We began by asking what could be done with the Interstate Commerce law. The first thing is to do something for it; that is, get the Sherman law out of the way, so that the railroad manager may know more definitely what the law requires and forbids. The first thing is to give the Interstate Commerce law a chance. The second is to repeal the imprisonment clause. This frees the freight agent to testify against his competitor and puts the punishment on the principal. Both of these measures are favored by Chairman Knapp. So far the principal parties seem to be agreed. This much, therefore, ought to be done, whether anything further is accomplished or not. On the question of giving the Commission more or better control of rates we need not at this time repeat our views. We may say, however, that it seems to us very unlikely that the conservative element in Congress, backed by a conservative president and the conservative business interests of the country, will give to the Commission complete judicial powers until that body can be given a thoroughly judicial character, including life-tenure. And to give the Commission a judicial character implies the creation of another body, to perform those functions now exercised by the Commission which are not of a judicial nature.

#### The Uganda Railroad.

The Uganda Railroad is at last completed, at least so far completed that on December 20 a locomotive reached Lake Victoria Nyanza at Port Florence, the lake terminus of the road. This sounds almost like a miracle. It is hard to realize that a railroad had actually been built from deep water to the equatorial lakes, bringing Usogo, Uganda and Unyoro within a few hours of the British commercial and naval fleets. So far as concerns the betterment of condition of Equatorial Africa nothing more important has ever been done. We are not speaking now of the Sudan, a semi-civilized Mohammedan country, but of Equatorial Africa, a savage country of pagan negroes.

The people of Continental Europe have taken fresh alarm and look upon this as the British conquest of Africa. So it is, but it is a matter of vastly more importance to the negroes of Africa and to the broad interests of humanity than to the people of the British Islands. No man of information supposes that the railroad will pay materially more than working expenses. It will do well to do that. The interest charges will be lost for a generation or two; but this is the only sound way to attack savage Central Africa, if any one thinks that he ought to attack it. It is at least rational while the Cape-to-Cairo project is irrational. But we cannot now take time to develop this fascinating topic.

We have chronicled the progress of the Uganda Railroad from the time of Major Macdonald's reconnaissance and report in 1891, and shall recapitulate now only a few facts. The railroad is from Mombasa, on the Indian Ocean, to the northeastern corner of the Victoria Lake. Its ocean end is at latitude four, south, and its lake end is a few minutes south of the equator. The line as built is said by the press despatches to be 582 miles long. This is probably not far out of the way, and perhaps is exact. Major Macdonald's estimate was 657 miles. The latest report that we have is that of Sir Guilford Molesworth, when the surveys were still not completed and the length of line could only be roughly approximated. Some parts of the line are over a very difficult profile, the highest summit being about 7,500 ft. above the sea. We believe that the ruling grade on the steepest slope is a little more than 100 ft. to the mile.

The original notion that cheap native labor could be used broke down, and the workmen had to be brought from India; this fact, together with great mortality, the destruction of animals by the tsetse fly, the unexpectedly

difficult country and the entire lack of natural resources, such as timber and coal, must have made the line really very costly for a light, narrow gage road. (It is meter gage.) The original estimate, made on the report of Major Macdonald was £3,422 per mile; but when the rail-head had reached the 225th mile the cost had run up nearly £5,000 per mile, and the worst of the job had not been reached. Sir Guilford Molesworth thought it not improbable that the cost would be at least £7,000 per mile, but he estimated that a considerable part of the charge on the capital invested would be saved indirectly by the reduced cost of patrolling the Indian Ocean for the suppression of slavery.

The British Uganda Railroad is not only built by coolies from Hindoostan, but it is worked by a staff of Indian employees, who have mostly received their training on the Indian railroads. They are probably the only tropical people capable of supplying a great force of locomotive engineers, telegraphers, station agents, etc. They are not proof against the African coast climate, however. At times as many as 70 per cent. of the coolies employed in construction have been disabled by malaria. The coolies live in villages along the line, and these villages are surrounded by palisades to keep out the lions, which are numerous and have killed many men. The coolies are paid about five dollars a month.

#### New Railroad Building in 1901.

According to the best sources of information obtainable, including reports of the State Railroad Commissions, so far as they are yet completed, replies received from the railroads direct, and an estimate based on their previous reports, the mileage built in the United States during the year ending Dec. 31, approximates 4,518. Our figure last year was 4,804, and in 1899, 4,569. Without doubt, however, these figures are all too small, as it is very difficult to get complete reports from any source in many cases. This year the number of companies reported as having built is 342. Last year it was 286, and in 1899, 284. As in 1900, the State which has increased its mileage the most during the year is Texas, which reports 537 miles of track laid, by 16 different companies. (Further reference to the Texas report appears elsewhere in this issue.) Oklahoma Territory comes next in the list with 398 miles reported built during the year, and West Virginia is third with 266. Iowa, Michigan and Missouri also have built more than 200 miles apiece, and there are nine States that have built more than 100 miles, in addition to those named above, as follows: Minnesota, 175; Indiana, 164; Wisconsin, 133; Ohio, 118; Mississippi, 109; New Mexico, 106; South Carolina, 105; Louisiana, 104, and Pennsylvania, 101.

The returns from the companies having new work under consideration were very unsatisfactory, but the following companies reported over 100 miles under way: The Kansas City, Mexico & Orient heads the list with 554 miles in the Southwest located, although it is not all under contract as yet. The Blackwell, Enid & Southwestern has 153 miles building; the El Paso & Southwestern, 143; the International & Great Northern, 130; the Choctaw, Oklahoma & Gulf, 110, and the Missouri Pacific, 102.

The Minister of Railways and Canals, Ontario, gives the statement that 658 miles of railroad have been completed this year in Canada by 163 companies. Last year this figure was not obtained, hence a comparison cannot be given.

The following list shows the progress in each State, compared with similar figures in 1900. The starred returns were obtained direct from the Railroad Commissioners:

	1900.	1901.
Compa- nies.	Mileage.	Compa- nies. Mileage.
Alabama .....	13 187	7 71½
Alaska .....	1 4.5	1 3
Arizona .....	4 48	2 70
Arkansas .....	9 135	4 65
California .....	11 170.15	10 79.5
Colorado .....	7 139.6	2 61.37
Connecticut .....	.. ..	.. None
Florida .....	10 157.5	29 76
Georgia .....	10 169.04	5 93
Idaho .....	3 50.41	9 79
Illinois .....	7 95.8	8 81.17
Indiana .....	4 66.7	2 164
Indian Territory .....	3 138.16	3 93
Iowa .....	5 279.26	5 238
Kansas .....	.. ..	3 57
Kentucky .....	4 29.9	6 73
Louisiana .....	13 202.93	8 104
Maine .....	1 12	1 12
Maryland .....	2 7	3 42
Massachusetts .....	.. ..	1 7
Michigan .....	9 126.35	18 205.56
Minnesota .....	8 254.79	10 175
Mississippi .....	6 172.92	5 109.85
Missouri .....	7 67.5	8 201.35
Montana .....	3 31.12	3 83
Nebraska .....	2 100.33	.. ..
New Hampshire .....	1 18.54	1 5
New Jersey .....	2 4.44	1 5
New Mexico .....	.. ..	2 106
New York .....	4 10.48	70 30.94
North Carolina .....	10 114.76	7 95.4
North Dakota .....	2 118.93	3 55
Ohio .....	6 27.1	.. 118.35
Oklahoma Territory .....	5 169.4	3 398
Oregon .....	4 67	2 32
Pennsylvania .....	31 234.86	32 101.67
South Carolina .....	6 145.76	7 105
South Dakota .....	3 101.6	2 35
Tennessee .....	11 145.59	6 79.5
Texas .....	18 313.43	16 537
Utah .....	2 8.95	.. ..
Vermont .....	1 25.2	1 18
Virginia .....	6 70	14 34.5
Washington .....	9 88.8	7 83
West Virginia .....	11 215.7	10 266.5
Wisconsin .....	8 110.3	7 133
Wyoming .....	4 152.81	1 32
Canada .....	.. ..	163 658
	286 4,804.	342 4,518

#### NEW PUBLICATIONS.

*American Street Railway Association.*—The report of the twentieth annual meeting of the American Railway Association held in New York City last October is published in pamphlet form. It may be had at the office of the Association, No. 2020 State Street, Chicago, Mr. T. C. Pennington, Secretary. It is a pamphlet of 342 pages containing a great deal of information of interest and value.

*The Centrifugal Pump, Turbines, and Water Motors; Including the Theory and Practice of Hydraulics.* By Charles H. Innes, M. A. Third edition, 12 mo., 226 pages. Engravings and index. Manchester: The Technical Publishing Company, Limited, 1901. Price 4s 6d. In the preface to this third edition, dated December, 1901, Mr. Innes says that he has added a method of Turbine design, mainly graphical, for which he is indebted to Prof. Rateau. He has also introduced a description of steam turbines for which he is indebted to the Hon. C. A. Parsons. The book is a concise and convenient manual brought well up to date and made accessible by an analytical table of contents and a good index.

*The Passenger Traffic of Railways.* By Walter E. Weyl. Being No. 16 of the publications of the University of Pennsylvania; series in Political Economy and Public Law. Pamphlet octavo, 250 pages. Ginn & Co., selling agents, Tremont Place, Boston, Mass.

Dr. Weyl's study of passenger traffic covers the subject pretty broadly. He considers the effect of improved travel upon society; the origin and growth of railroad travel; the incentives to travel; the theory of passenger fares; and the policy, practice, and results in the matter of passenger travel on the Continent of Europe, in Great Britain, and in the United States. He considers the elements of the cost of passenger traffic, and its actual and possible profits, something of its probable future, and still other details. He has collected many statistics which serve not only for the development of his topic, but for reference for those who have occasion to make special studies. Dr. Weyl has been at work on this matter for a number of years and has collected much of his material at first hands by travel and study in Europe.

*Massachusetts State Board of Health, Thirty-Second Annual Report, for the year ending Sept. 30, 1900.* Boston: Samuel W. Abbott, M. D., Secretary.

The annual reports of the Massachusetts State Board of Health are always valuable and instructive documents. The report this year is a stout octavo of 892 pages, with an index, and it contains the usual statistics as to water supply, and sewerage, and as to public health, together with many special reports. The death rate in the State of Massachusetts for the year 1900 was 18.24 per 1,000. The rate for the half century just ended was 19.5. The death rate of a number of countries, and for different years, is shown in a comparative table from which it appears that in 1899 the Massachusetts death rate was 17.4; in England and Wales it was 18.3; in Germany, 21.5; in France, 21.1; and in Hungary, 27. In the year 1900 the increase in deaths from the principal infectious diseases amounted to 8.7 per cent., while the ordinary increase in population would have been only 2.5 per cent. The most fatal of these diseases was pneumonia, from which 5,282 persons died in the year. Next was consumption with 5,199, and next cholera infantum with 2,393. The diminution of the fatality from consumption is extremely encouraging. In 1900 the deaths from this cause were considerably less than half as many as in 1853. There is a steady decrease, also, in the typhoid death rate, which, in 1900, was but little more than one-quarter as great as in 1871.

#### TRADE CATALOGUES.

*High-Pressure Hydraulic Valves and Fittings.*—Watson Stillman Company, 204 E. Thirty-third street, New York City, will publish shortly a sectional catalogue, No. 63, relating to high-pressure hydraulic valves and fittings, a book of about 100 pages. They wish to distribute this book wherever it is wanted and ask that requests for the catalogue may be accompanied by some statement of the position or line of business of those asking for it.

*Locomotive Coaling Stations.*—The Brown Hoisting Machinery Company, Cleveland, Ohio (also 26 Cortlandt street, New York; Carnegie Building, Pittsburgh, and 39 Victoria street, London, S. W.), issue a special pamphlet describing applications of "Brownhoist" to locomotive coaling stations. There are some interesting views from photographs of an installation on the Baltimore & Ohio, and also a short description of the general arrangement with line drawings.

*Emery and Corundum Goods and Grinding Machinery.*—The Norton Emery Wheel Co., Worcester, Mass., has just issued a new catalogue. It measures 6 in. x 9 in., has 164 pages and contains illustrations and descriptions, with prices, of the extensive line of emery and corundum products made by the company. Considerable space is given to grinding machinery, including the Norton plane grinder especially adapted to locomotive work. This was illustrated in the *Railroad Gazette*, June 14, 1901, p. 411.

*The Royal Wood Preserver Co., St. Louis, Mo.,* has issued a small pamphlet on the subject of its "Royal" wood preserver, which is recommended for all wood work subject to rapid decay. It is a thin liquid of heavy specific gravity which is applied with a brush or by immersing



the wood. About 30 pages are given to letters from various companies which have used this preserver with good results. The results of a number of comparative tests of treated and untreated timber are recorded.

**Williams Engines.**—The Quincy Engine Works, Quincy, Ill., send a pamphlet, being lists descriptive of the Williams engines, built by that company. These are built in standard parts and largely interchangeable. The plan is not to engage in special work, but to build standard designs fully worked out and approved by test and experience. The company will, however, if requested, submit estimates on modified engines. The lists give details of 50 standard numbers of compound, condensing and non-condensing engines. These run from 10 and 18-in. cylinders and 16-in. stroke up to 19 and 38-in. cylinders by 32-in. stroke. The tables give pressures, revolutions per minute, and horse power at 70 per cent. cut-off and at 28 per cent. cut-off.

**The Washburn Coupler Co.,** Minneapolis, Minn., has issued a new catalogue describing its couplers with flexible heads, its couplers with standard fixed heads being described in a separate catalogue sent out a short time ago. The details of various flexible head couplers for passenger cars, for freight cars and for locomotive tenders and pilots are shown by drawings and photographs. It is said that of the hundreds of flexible couplers now in use, none has broken. The flexible head is alike for all and is pivoted to a shank suitable for the service. The head has an extension at the rear of the pivot pin which is acted on by side centering springs. Other recent improvements brought out by this company are shown in the catalogue.

**Wood-Working Machinery.**—J. A. Fay & Egan Co., Front and John streets, Cincinnati, Ohio, send their new catalogue, Series L, which has just been issued. It is a fine quarto (9½ x 12½ in.) with an alphabetical index and bound in muslin. Heretofore J. A. Fay & Company and the Egan Company have issued separate catalogues, but for the greater convenience of their customers they have decided to combine those publications in one catalogue as has now been done. The Fay Company was founded in 1830, and the Egan Company in 1874, and they were consolidated in 1893. The facilities of the united companies are so great that they are able to make a specialty of many different kinds of machines. They tell us that no single shop in the world builds so many machines of a kind as are built by them in each department. Their plant covers 11 acres of floor space. In the past three years the new company has taken out nearly 200 patents on improvements. The catalogue describes individual machines at unusual length and illustrates them very well, not by half-tones from photographs, as is now so much the custom, but by wood engravings. The result is, as everybody knows, much better detail in the pictures.

#### The Indicator in Rowing.

In a recent issue of the *Journal of the Worcester Polytechnic Institute* C. M. Allen describes a novel application of the steam engine indicator, whereby the instrument was made to record the work done by an oarsman in a boat. The boat to which the apparatus was applied was fitted with a row-lock held in position by a system of levers, the end of which had a bearing upon the piston of a Crosby indicator. The rowlock had a possible motion of about ¾ in., but in service it amounted to even less, so that the effect on the oarsman was nil. The drum of the indicator was driven by the reduced horizontal motion of the oar.

With such an arrangement on each side of the boat, the coach is enabled to indicate the exact amount of pull that is put into the oar at each point of the stroke; to measure with great accuracy the exact length of the stroke and from an examination of the curve, to determine the proper location of the foot rests and the rowlocks relatively to the seat so that the maximum effect may be produced by the man in accordance with his reach. Not only do the diagrams show the wide difference existing between the work done by the unskilled and experienced oarsman, but it also shows where the latter may improve his useful effect by a better distribution of the effort which he is putting forth on the oar.

#### TECHNICAL.

##### Manufacturing and Business.

The Protectus Company, of Philadelphia, makers of preservatives for wood and metal, have opened an office in New York City, in the Aldrich Court, at 45 Broadway. Manton E. Parker and M. A. Robinson are the sales agents and representatives in this district.

The Georgia Car & Manufacturing Co., Savannah, Ga., is giving special attention to car building for the Southern roads. It has just completed an order for 100 flat cars for the Southern Railway.

The H. W. Johns Manufacturing Co., of New York, and the Manville Covering Co., of Milwaukee, each company having been closely identified as handling the goods manufactured by the other, have consolidated their interests. This consolidation is to take effect Jan. 1. The new company, whose capital stock will be \$3,000,000, will be known as the H. W. Johns-Manville Co. The officers of the new company will be: Mr. T. F. Manville, President; Mr. C. B. Manville, Vice-President; Mr.

George W. Gladwin, Vice-President; Mr. F. R. Boocock, Treasurer; and Mr. H. E. Manville, Secretary. Mr. James G. Cannon will be Chairman of the Board of Directors. Mr. C. R. Manville will be Manager of the Western Department, and he, with Mr. C. B. Manville, will remain in Milwaukee. Mr. T. F. Manville and Mr. H. E. Manville will remove to New York. The new company is rapidly completing a plant at Milwaukee for the manufacture of carbonate of magnesia and mineral wool. When this plant is completed, the company will be prepared to furnish a most complete line of all grades of steam pipe and boiler coverings and asbestos goods of all descriptions.

#### Iron and Steel.

It is reported that the rail pool will continue in force for another year under the present agreement.

F. H. Clergue, President of the Lake Superior Power Co., denies the report that a shipbuilding plant will be built at Sault Ste. Marie.

The Phoenix Iron Works was incorporated in Connecticut last week, by J. H. K. Davis, Edward D. Redfield and others, who recently bought the Lincoln Iron Works, Hartford.

The Mexican National road will be made standard gage and it is estimated that about 120,000 tons of rails will be required.

The Bryant Mfg. Co. was incorporated in New Jersey last week, with a capital of \$1,000,000, to make iron, steel, etc. Howard M. Carter, John J. Billings and K. K. McLaren are the incorporators.

The plan to build a steel plant on the Delaware River at Billingsport, N. J., which was considered last spring by a syndicate, including Henry C. Frick and A. W. Mellon, of Pittsburgh, and Henry G. Morse, President of the New York Shipbuilding Company, has been abandoned.

The Board of Directors of the Sharon Steel Co. have decided to increase the pig iron production by the erection of two additional furnaces with a capacity of 350 tons each per day, instead of one 700-ton furnace. When the new furnaces are finished the daily output of iron will amount to 1,200 tons. The skelp mill will be placed in operation about April 1 and the tube mill in June. Twelve sheet mills now building will be placed in operation next May.

#### Blast Furnace Record of 806 Tons.

On Dec. 10, stack No. 2 of the National Steel Co., at Youngstown, Ohio, working on Bessemer ores, produced 806 tons of iron. This is the greatest record ever made by any blast furnace in the world. The stack is 105 ft. high and was finished during the past year. The iron from this furnace is converted into steel at the Ohio mill.

#### The June Conventions.

The thirty-sixth annual convention of the Master Car Builders' Association will be held at Saratoga, N. Y., commencing Wednesday, June 18, 1902. The thirty-fifth annual convention of the American Railway Master Mechanics' Association will also be held at Saratoga, N. Y., commencing Monday, June 23, 1902. Headquarters will be at Grand Union Hotel. Members of the Associations will have preference of rooms until March 15, 1902. Applications for rooms should be made to Woolley & Germans, Saratoga Springs, N. Y., and the Committee of Arrangements requests that the members should apply at once for rooms. The Joint Committee of Arrangements consists of Messrs. G. W. West, F. W. Brazier and F. A. Casey.

#### The Brooklyn Bridge.

The Grand Jury of New York has made a presentment in the matter of the care of the New York and Brooklyn Bridge. In brief, the jury declares that the bridge has not been regularly or systematically inspected, and that its management has not been up to the standard of well-conducted private concerns. Furthermore, the opinion is expressed that while the bridge is safe, the anchorages and parts of the floor system should not be subjected to additional strains because the present strains are close to the limit of safety. The Grand Jury recommends a more rigid and complete inspection of the bridge than was possible in the time at the disposal of the engineers appointed by the District Attorney, and further that adequate and competent inspection and care should be kept up in future, and finally that there should be some system of regulating the traffic so as to avoid special strain at any one point.

#### The Carnegie Research Scholarship.

A Research Scholarship, under the care of the Iron and Steel Institute (British) was founded a year or two ago by Mr. Andrew Carnegie, who presented to the Institute 64, \$1,000, Pittsburgh, Bessemer & Lake Erie Railroad Company 5 per cent. debenture bonds for the purpose. The Secretary again calls attention to this scholarship in a circular issued Nov. 6. The object is not to facilitate ordinary collegiate studies, but to enable students, who have passed through a college curriculum or have been trained in industrial establishments, to conduct researches in the metallurgy of iron and steel and allied subjects, with the view of aiding its advance or its application to industry. There is no restriction as to the place of research which may be selected, whether university, technical school, or works, provided it be properly equipped for the prosecution of metallurgical investigations. The appointment is for one year, but the Council may renew the scholarship for a further period.

#### Electric Hoists for Unloading Ships.

The C. W. Hunt Co. has issued a circular telling something about arrangements for unloading ships by electric hoists and automatic railroad. An engraving is given showing a plant which handles 25,000 tons of coal yearly in New York harbor. The coal is hoisted in tubs of about one-third of a ton capacity to the level of an automatic car, which distributes it to the yard. The car runs on an overhead track and requires neither steam, horse or manual power for its operation. Before the establishing of this hoisting plant the coal was hoisted by horsepower. The old equipment cost \$1,750, the new \$2,800; the cost of handling to the stock pile with the old equipment was 17¼ cents per ton, including interest and depreciation. With the new plant the cost is 7¼ cents. The old plant handled 120 tons a day. The new plant can handle 2,000 tons a day. The electric power is bought by meter at 5 cents per horse-power-hour.

#### An Association of Mechanical Officers.

The mechanical officers of the Vanderbilt Lines have formed an organization of which Mr. A. M. Waitt is Chairman. This will cover the New York Central & Hudson River, the Boston & Albany, the Lake Shore, the Michigan Central, the West Shore, the Big Four, the Nickel Plate and other lines. The plan is to have conferences every two months. This is a most admirable enterprise and will undoubtedly be of great use to the companies. It is pretty well-known, no doubt, that the Pennsylvania Lines West of Pittsburgh have for some time had an association of transportation officers which is thoroughly organized and does a great deal of excellent work through its committees. There are on the Pennsylvania System other and less important organizations of somewhat the same nature.

#### Air-Brake Cars at Nashville.

Report of air-brake cars cut out coming into the Nashville yard of the Nashville, Chattanooga & St. Louis Railway, November, 1901.

Blowing at exhaust.....	70
Blowing at vent port.....	27
Triple valve needed cleaning.....	33
Triple piston packing ring worn out or broken.....	13
Works emergency, service application.....	19
Check valve case gasket blown out.....	18
Release valve leaking.....	16
Thread stripped on triple valve body.....	3
Brake cylinder piston packing worn out.....	2
Brake cylinder gasket blown out.....	3
Unions leaking.....	98
Branch pipe broken.....	14
Train pipe broken.....	8
Hose and angle cock gone.....	1
Angle cock leaking.....	9
Piston travel too short.....	2
Flat wheels.....	26
Brake rigging out of order.....	35

Total.....397  
Cars leaving Nashville with brakes cut out.....129

Cars repaired.....268  
Air-brake cars cut out leaving Nashville yard, November, 1901.

Number of air-brake cars forwarded.....	9,052
Number of air-brake cars O. K.....	8,923
Air-brake cars cut out.....	129
Average serviceable air-brake cars per train.....	16
Of the 129 cars cut out, there were:	
Blowing at exhaust.....	29
Blowing at vent port.....	5
Check valve case gasket blown out.....	8
Triple valve needed cleaning.....	2
Release valve leaking.....	6
Brake cylinder packing leather worn out.....	2
Brake cylinder gasket blown out.....	3
Piston travel too short.....	2
Hose and angle cock gone.....	1
Angle cock leaking.....	2
Train pipe broken.....	8
Branch pipe broken.....	10
Flat wheels.....	26
Brake rigging out of order.....	25

Total.....129

Of the 129 cars cut out 86 belonged to railway companies, and 43 to private car lines.

Of the air-brake cars forwarded 7,248 were equipped with apparatus of the Westinghouse Air Brake Co., 1,784 with apparatus of the New York Air Brake Co., 17 with apparatus of the Lansberger Air Brake, 3 with apparatus of the Boyden Air Brake.

#### The Water-Tube Locomotive Boiler.

Mr. D. Drummond, Locomotive Superintendent of the London & South-Western Railway, has built a small locomotive boiler with about 800 sq. ft. of heating surface in which he has used water-tubes in the body of the boiler. He puts in a large central flue in the inside of the boiler which is crossed in two directions by short water tubes. On each side of this main central flue are nine fire-tubes for the better staying of the structure.

#### New Jersey Locomotive Company.

The New Jersey Locomotive Company filed articles of incorporation in Passaic County, Dec. 18. The capital is placed at \$100,000. The object of the company is to build locomotives, machinery and cars. The incorporators are A. L. Curtis, J. Clinton Walker, and Frederick W. Cooke. The principal office is in Paterson, at the same address as the American Locomotive Company. Mr. Cooke is Superintendent of the Cook Works of the American Locomotive Company.

#### Hall Block Signals in England.

It is cabled, Dec. 23, that the *Westminster (England) Gazette* announces that the North Eastern Railway Company has contracted with the Hall Signal Company "to equip its system" with Hall automatic signals. This is probably not wholly true. At the time of the return, a few weeks ago, of Mr. George Gibb, General Manager, from his inspection of United States railroads and their block signal systems, he asked the Hall company for an estimate on a small trial installation near York. That estimate was mailed to him and accepted. This week Mr.



Gibb has cabled a request to suspend work on the order and await a letter asking estimates on a larger order.

#### An Air-Brake Decision.

Last Saturday, Dec. 21, an important decision was rendered in a suit of the Westinghouse Air Brake Co. against the New York Air Brake Co. The decision was by Judge Coxe, in the U. S. Circuit Court, Northern District of New York. It was a suit for infringement by the New York Air Brake Co. of the Westinghouse-Moore patent No. 401,916, dated April 23, 1889, on an engineer's valve. It was claimed that the defendant's valve, patent No. 504,290, to Vaughan and McKee, dated Aug. 29, 1893, infringed the Westinghouse-Moore patent, and the defense was non-infringement. The Judge says that the Westinghouse valve is the first engineer's valve giving complete control over a very long train under all ordinary conditions. "There is nothing in the prior art which materially affects the invention except what was done by Mr. Westinghouse himself." It was argued by the defendant that in view of the prior Westinghouse devices the claims in suit must be limited so as not to include the defendant's device. The Judge thinks that this sort of proposition does not commend itself strongly to a court of equity. The opinion analyzes the subject at considerable length, but we cannot go into that analysis at present. The upshot of the matter is that the court finds that several of the claims in suit are infringed and says that "the features which combine to make the defendant's valve successful were appropriated directly from the patented structure. The complainant is entitled to a decree."

#### Automatic Signals on the London & South Western.

The introduction of the Pneumatic Railway Signal Company's low-pressure interlocking and its electro-pneumatic (low-pressure) automatic block signals on the London & South Western Railway of England has already been noted in the *Railroad Gazette*. We now learn that the second contract which the company has awarded for these signals includes interlocking which aggregates no less than 450 levers. The line to be equipped is from Basingstoke to Woking, 23 miles, all four-track. The interlocking is at eight intermediate stations, none of it at either Basingstoke or Woking. As the main line signals at all these interlockings are incorporated in the automatic system, the cabins can be closed at night, or whenever there is no yard work to be done; and, in fact, the cabins at some of the stations are attended only about two hours a day. The signalman, on leaving his cabin, simply puts the main-line levers in the all-clear position. The automatic signals are supported on steel bridges spanning the four tracks. The block sections are about 3,300 ft. long, with a home and a distant signal on each post.

#### THE SCRAP HEAP.

##### Notes.

The Schuylkill Traction Company, of Philadelphia, operating 27 miles of electric road and employing 100 men, has notified employees that ten per cent. of the receipts for the week preceding Christmas will be given to them as a Christmas present.

The Carnegie Company, at Pittsburgh, announces the establishment, for the benefit of its old and incapacitated employees, of a pension fund, which is organized on a plan quite similar to that of the Pennsylvania Railroad Pension Fund, though there is no compulsory age of retirement. This fund which, as heretofore announced, was started by a gift of \$4,000,000 from Mr. Carnegie, is entirely independent of the arrangements already in force by which the company itself grants relief to aged employees. The payments from the new fund will be wholly gratuitous, no employee having any claim on it; but the committee in charge of it, of which Mr. Charles L. Taylor is chairman, will give prompt and careful attention to all applications.

The Brooklyn Heights Electric Street Railroad, Brooklyn, N. Y., has been found guilty, by a jury, of violating the law forbidding the employment of a motorman more than 10 hours in 12 consecutive hours. The penalty is a fine of from \$500 to \$1,000. The company will appeal the case. The New York Central & Hudson River has been indicted by a Grand Jury at Herkimer, N. Y., on a charge of manslaughter in the second degree, the offense being the negligence or misconduct of the company in the care and management of the building at Herkimer which, on Aug. 19 last, was wrecked, resulting in the death of six men, by an explosion of dynamite and gasoline. The Louisville & Nashville has been fined for contempt of court, at Louisville, for disobedience of an order directing the road to deliver cars of live stock to the Central Stock Yards. The President of the Atlanta (Ga.) Rapid Transit Company has been fined \$50 for transporting freight on cars through the streets of the city.

The Committee of the Pittsburgh Chamber of Commerce, which has been investigating the freight congestion in that city and looking for the cause of it, has made a report in which it is said that probably not over 75 per cent. of the freight which is offering could be moved without delay even if the railroads should use all their available engines and cars for the benefit of that city. This means that the volume of traffic is thus limited by the capacity of the tracks and of the facilities for loading and unloading. Many of these tracks and facilities are on the premises of the shippers and receivers. The Committee

finds that during the past year the railroads have increased their supply of freight cars 10 per cent.; and, in view of the greater capacity of the cars, it is estimated that the increase, from the shippers' standpoint, is equal to 12½ per cent. The railroads show that they had ordered large numbers of new cars and new engines lately, and that many of these orders have not been filled on time, for the reason that the strike of the steel workers cut off the supply of steel and thus delayed the construction of the engines and cars. Mr. Robert Pitcairn, General Agent of the Pennsylvania Railroad, was a member of the committee.

#### Traffic Notes.

Mr. Davis, Industrial Agent of the Atchison, Topeka & Santa Fe, has resigned, and he is succeeded by Mr. Wesley Merritt, hitherto a Division Engineer. This is the first instance, so far as we recall, in which an engineer has been appointed to a position of this kind.

The Railroad Commissioners of Texas announce that they have prepared a new general freight tariff; and a hearing to allow the presentation of objections was appointed for Dec. 17. The present tariff was issued several years ago, immediately after the railroads applied for an injunction to annul the commissioners' rates and as a result of a compromise between the commission and the railroads. One of the commissioners says that the tariff now proposed will make appreciable reduction in rates.

Changes in the official freight classification, affecting several hundred articles, appear in the new issue, which takes effect Jan. 1. Most of the changes are of a minor nature, except those relating to carload shipments, which have been adjusted to the new rule which is based on the length of the car. This change has been described in our columns in the reports of the doings of the American Railway Association.

Chicago papers say that a freight rate agreement entered into by the executive officers of the roads between Chicago and the Missouri River, which is expected to straighten out the tangles now existing in that territory, has a clause providing for the publication of all export rates. The tariffs for export shipments have never been printed by these roads, and publication of them is considered good evidence of the strength of the new agreement.

President E. P. Ripley, of the Atchison, Topeka & Santa Fe Railroad, is reported as saying, speaking of reports that the Atchison is to make an effort to get a share of the freight traffic across the Pacific Ocean: "The Oriental trade is an empty shell. There is nothing in it for us. The only reason we try to compete for this trans-Pacific trade is on account of the prestige it gives to the road. It is not because we are making money at it. The Northwestern railroads have an advantage, as they carry the wheat of the Northwest to the coast for export."

The joint validating agency which the railroads have established at Charleston, S. C., to handle excursion tickets in connection with the Exposition in that city appears to be managed in a very energetic way. On one day recently the men employed by the agency took up 20 tickets which had been fraudulently manipulated by scalpers. At Kansas City the railroads have discovered that the ticket scalpers have been using a false perforating stamp made in imitation of that used by the Union Depot Company; also counterfeit conductors' train checks, and forged live stock contracts, which include the transportation of the man who accompanies the stock and is exchangeable for a ticket. The Mayor of Kansas City has vetoed an anti-scalping ordinance passed by the City Council and has been sustained by the lower house. The plea of the railroads that it would insure better rates he says is "soothing syrup."

#### Another Prince at Altoona.

Prince Yoshio Yarmarnoto, of Japan, is taking an apprentice's course in the Pennsylvania Railroad shops at Altoona. He is at present working in the repair shop. It was his wish to start in this department. He says: "I wanted to get an idea of how the repairs are made. I wanted to learn what parts wear out first," which is a very sensible way for a high administrative officer to begin.

#### Seems Like Old Times.

One of the few small railroads in New England which have not been swallowed up by a big company is the South Manchester, two miles long, with two locomotives, four cars and six general officers who are eligible candidates for exchange annuals. Being a small road it naturally retains some prehistoric customs, as will be seen by a perusal of the following reporter's story:

"An interesting railroad incident occurred here yesterday morning, resulting in considerable mirth at the expense of the crew on the South Manchester railroad. The first trip on this road each morning is to carry the Manchester employees to the Cheney silk mills. Then the train returns to the Manchester station to meet the 7:32 train going west on the Highland Division. The train left the South Manchester station yesterday morning at 7:20 as usual on this trip, but a minute after the start the coupling between the engine and car parted. Only one car is needed for this trip as travel is light at that time. The car stopped immediately, but neither the engineer nor fireman noticed the accident, so the engine steamed merrily on to Manchester, leaving its load behind. On and on the engine continued, carefully whistling at crossings, the engineer and fireman sitting serenely in their places. A few hundred yards from the Manchester station the engineer attempted to apply the air-brakes, but they did not work. Then he whistled for brakes, but they didn't work either, because the car to which they were attached was stalled in the South Manchester freight yard two miles away. The conductor also was left behind by the accident. The engine returned back in a hurry for the car, but the story got out and caused much humorous comment."

Whether straight air is in vogue on that road, or that part of the story was overlooked by the censor, or the whole story was made by an unskilful artist, the reader will have to decide for himself.

#### The Quebec Bridge.

M. P. Davis, contractor for the superstructure of the Quebec Bridge, says that his work on the bridge is half finished. The superstructure on the north side of the river is finished and the machinery will be moved to the other side and work begun there. The cofferdam on the southern pier will be started in February.

#### Industrial Depression in Austria-Hungary.

There is every indication that Austria-Hungary is on the eve of great industrial depression. The wave of in-

activity which has been influencing Germany for the past two years appears to be moving eastward. In many of the iron and steel works in Northern Austria, work has been reduced, and some establishments have notified their men that if orders are not soon received they will shut down at the close of the year. It is furthermore stated that the Austrian locomotive works have not received a foreign order for months, and that, inasmuch as with their present force of employees the entire home demand for 1902 will be supplied within a few months, the prospects for the ensuing year are rather gloomy. Car shops, furniture and tool factories, sawmills, and similar establishments are only partially employed, and the building trades complain of general inactivity. The Governments of both halves of the monarchy have been petitioned to come to the rescue of the languishing industries, by entering as soon as possible upon the execution of certain public works originally planned for 1902 and 1903, and by letting at once the contracts for such army supplies and railway rolling stock as will be needed during the coming year. Both Governments have declared themselves disposed to favor the proposed measures, and a number of large contracts will doubtless be let at once, and others will follow as soon as the necessary appropriations have been made by the respective parliaments. It has been officially stated in the Austrian Parliament that the Ministry of Railroads will expend in the near future, for the purchase of locomotives, cars, track material, etc., about 57,000,000 crowns (\$11,570,000), and that, if the budget for 1902 is promptly passed, other contracts, amounting to 30,000,000 crowns (\$6,000,000), will soon be let by the several other departments of the Government.—*Consular Reports*.

#### The Westinghouse Interests in France.

Recent despatches from Paris say that the Société Anonyme Westinghouse (Westinghouse Joint Stock Company) has been organized with a capital of 20,000,000 francs, to acquire the Société Industrielle Westinghouse, a concern of 10,000,000 francs capital, which hitherto controlled the patents and rights of manufacturing and selling Westinghouse electrical machinery in France. The new company will also control the market for Westinghouse electrical apparatus in Italy, Belgium and Switzerland. It also acquires the right to sell Westinghouse gas engines in all the countries above mentioned. The Société Anonyme Westinghouse, in addition to its handling Westinghouse electrical machinery and gas engines, has, it is said, obtained control of the Westinghouse air-brake patents for France, Italy, Belgium and Switzerland.

#### Affection Is Not Art.

A correspondent of the New York *Sun* writes: "V for U.—This silly affection is now spreading over the country, and is liable to become identified with John L. Sullivan's visiting cards. I was in Albany last week, while waiting for a train in the new depot of the New York Central, the following legends met my eye:

"RESTAURANT.

"PVLIMAN CAR OFFICE.

"HUDSON RIVER DIVISION.

"Happily, the barber shop was only a 'parlor' in this instance, so an afflicted community escaped 'stydio.' Well, we have Tryst Companies, artists' studios, cvstom tailors, etc., and we might as well have peavty peddlers and frvit stands. That's so—and see how funny Mr. Tilden's favorite word for unearned increment would look—"vsvfrvet." Last of all, let me condemn (with a hundred others of your readers) the inscription V. S. A. (for U. S. A.) on the Buffalo Exposition medals and diplomas. What can a foreigner make out of V. S. A. anyhow?"

#### Potomac River Highway Bridge.

On Dec. 17 the Secretary of War sent to Congress a letter from Gen. Gillespie, Chief of Engineers, U. S. A., submitting the report of the Board of Engineers appointed to select a site and prepare plans and specifications for a highway bridge across the Potomac River at Washington, as provided by Congress last February. The Board submits two sets of plans, No. 1 of which can probably be built for \$575,000, or within the amount appropriated, but it is not considered desirable; and No. 2, which the Board considers a much better plan, but which will cost \$996,000, or more than the appropriation, but which is recommended by the Board. The report goes into the requirements and traffic of the proposed bridge in great detail, and says that plan No. 1 would only permit of a single-track electric railroad bridge and 5-ft. footways, which are inadequate, and that true economy and future needs demand a double-track railroad, two 8-ft. carriage ways, two 8-ft. sidewalks, or a total width of 58 ft., as provided by plan No. 2, which contemplates a Pratt truss steel bridge of 11 spans on pile foundations. The two plans and all details are referred back to Congress for further action.

#### Locomotive Industry of Austria.

The locomotive industry of Austria comprises five different establishments, employing 5,200 workmen, viz.: The machine works at Florisdorf, with 1,300 men; the machine shops of the State Railway Company at Vienna, with 1,300 men; the locomotive works at Wienerstadt, with 1,400 men; the Kraus Machine Factory at Vienna, with from 400 to 500 men; and the Bohemian-Moravian Locomotive Works at Prague, with 800 men. The total number of men employed in normal times is about 6,000. The total annual capacity of the five establishments is about 400 locomotives, and their annual earnings are between \$4,060,000 and \$5,075,000. The various establishments have at present orders for 92 locomotives and 24 tenders from the State, and for some 20 locomotives from railroad corporations doing business in Austria. Foreign orders were quite frequent in former years, and even as late as 1900, no less than 60 Austrian-built machines went to Belgium and France. During the present year, however, the only foreign order received has been one from Egypt for six locomotives. Unless new contracts are obtained in the near future, four of the five locomotive-building establishments will be without work within six months. In fact, the blacksmiths and turners will be left idle much sooner—in January or February, at the latest.

#### Compressed Air Hauling.

Traction by compressed air is being installed at the Massachusetts Cotton Mills, at Lowell, Mass., as the result of the factory mutual insurance companies objecting to traction machines operated by steam or electricity on account of the fire hazard involved. About 3½ miles of trackage outside are to be thus operated, as well as about two miles under cover.—*Compressed Air*.

#### Fire Destroyed Nearly 200 Cars.

Nearly 200 street railroad cars were burned Dec. 15 in a fire in Chicago, which destroyed the barns of the Chicago Union Traction Co., at Lincoln and Wrightwood avenues. The loss of the company is about \$125,000.



## Senate Committees.

The Republican Caucus of the Senate last week decided upon the majority membership in 64 Senate Committees, among them being:

Commerce: Frye, McMillan, Elkins, Nelson, Gallinger, Penrose, Hanna, Mason, Depew, Jones (Nev.), Perkins.

Interstate Commerce: Elkins, Cullom, Aldrich, Kean, Dooliver, Foraker, Clapp, Millard.

Interoceanic Canals: Hawley, Platt (N. Y.), Hanna, Pritchard, Mitchell, Millard, Kittredge.

Post Offices and Post Roads: Mason, Penrose, Elkins, Dooliver, Lodge, Deboe, Beveridge, Dillingham, Mitchell.

Improvement of Mississippi River and Its Tributaries: Nelson, Dooliver, Millard, McLauren (S. C.).

Railroads: Clark (Wyo.), Nelson, Lodge, Hawley, Wetmore, Scott, Bard.

Pacific Railroads: Dooliver, Frye, Foraker, Stewart, Millard.

In the House of Representatives, the Democratic caucus has selected the minority representation on committees, and it is expected that the full committees of both houses will be announced soon after Congress re-assembles on Jan. 6.

## The Canal Report.

The U. S. Senate, on Dec. 18, ordered the printing of the full report of the Isthmian Canal Commission, including appendixes, maps and all exhibits, and the Public Printer is authorized to contract for the plates of the maps, etc., without advertising for bids.

## Railroads in India.

The accounts of the principal Indian railroads for the half year ending with last June are now available. The receipts from passenger traffic increased as compared with the first half of 1900 by 10.8 per cent., but the receipts from freight fell off 0.9 per cent. All gross receipts increased 2.5 per cent. The falling off in comparative freight traffic is due to the fact that in the preceding year there had been an enormous movement of grain and fodder into the famine districts; but on the other hand the improved conditions and removal of restrictions on travel permitted an expansion in the passenger movement.

## LOCOMOTIVE BUILDING.

The New York Central & Hudson River is having 21 locomotives built at Schenectady.

The Ulster & Delaware is having three locomotives built at the Schenectady Works.

The New York, Philadelphia & Norfolk is having two locomotives built at the Baldwin Works.

The Japanese Government has ordered 30 locomotives from the American Locomotive Co., for use on the Imperial Railroads.

W. E. Kelly & Co. have bought of F. M. Hicks a four-wheel switcher and logging engine, quick delivery. The engine will have 42-in. drivers.

The Michigan Central has ordered 10 locomotives from the American Locomotive Co., in addition to the order previously reported building at the Schenectady Works.

The Cincinnati, New Orleans & Texas Pacific order with the Baldwin Locomotive Works calls for 32 locomotives instead of 13, as reported in our issue of Dec. 20.

The Missouri, Kansas & Texas has ordered 10 locomotives from the American Locomotive Co., in addition to the order for 23 with the Baldwin Locomotive Works, noted Dec. 20.

The Louisville & Nashville order with the Rogers Locomotive Works, reported in our issue of Dec. 13, calls for 15 consolidation engines for July, August and September delivery. They will weigh 173,000 lbs., with 155,000 lbs. on the driving wheels, and have 21 x 28-in. cylinders and 56-in. drivers. Belpaire boilers with a working steam pressure of 190 lbs., and have 320 tubes 2 in. in diam. and 14 ft. long, fire-boxes 120 in. long, 40 in. wide, tender capacity of 5,000 gals. of water and 12 tons of coal. Specifications include Westinghouse brakes, Little Giant bell ringers, Monitor injectors, U. S. Metallic packing, Coale safety valves, Leach sanding devices and Nathan sight-feed lubricators.

## CAR BUILDING.

The Wabash has ordered 2,000 box cars from the American Car & Foundry Co.

The St. Louis & San Francisco has ordered four cafe cars from the Pullman Co.

The Mobile & Ohio has ordered a cafe car from the American Car & Foundry Co.

The Seaboard Air Line has ordered 500 box cars from the American Car & Foundry Co.

The Choctaw Northern has ordered two passenger cars from the American Car & Foundry Co.

The Toledo, St. Louis & Western has ordered 50 box cars from the American Car & Foundry Co.

The Chicago & North Western ordered 3,000 cars from Haskell & Barker, instead of 1,300 as reported.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 200 flat cars from the American Car & Foundry Co.

The Iowa Central will build several hundred cars at its own shops, including 350 stock cars and some box cars.

The Chicago, Burlington & Quincy is in the market for five parlor cars, in addition to a few cafe cars reported in a previous issue.

The Illinois Central has ordered 1,500 box cars of 80,000 lbs. capacity from the Pullman Co., and is about to place orders at its Burnside shops for stock cars.

The Chicago, Rock Island & Pacific will build 100 single-deck stock cars at its own shops, and has ordered four dining cars, four combination baggage and mail, and two postal cars from the Pullman Co.

The Republic & Grand Forks, British Columbia, has ordered five box cars of 60,000 lbs. capacity from the Illinois Car & Equipment Co., to be equipped with Hutchins roofs, Westinghouse brakes and couplers.

F. M. Hicks, of the Hicks Locomotive & Car Works, is building for Wallace Bros. Circus, a special car to be 80 ft. long inside measurement of the body. It is to be used for a private car and will have six staterooms, kitchen, closet, etc., and 6-wheel trucks.

The Rodger Ballast Car Co. has sold to the Rutland 75 of their new 34-ft., 40-ton convertible ballast and flat-

bottom gondola cars, equipped with air and vertical hook couplers; also two Standard Rodger ballast distributing cars, March, 1902, delivery. This is in addition to the 25 cars mentioned Nov. 29 as having been purchased by the Rutland.

The Missouri Pacific order with the American Car & Foundry Co., reported in our issue of Dec. 13, calls for 500 coal cars of 80,000 lbs. capacity, February delivery. They will weigh 35,000 lbs. and measure 35 ft. 7 in. long, 8 ft. 10 in. wide and 48 in. high. The specifications include Player bolsters, Damascus brake-beams, Westinghouse brakes, Universal brasses, Miner draft rigging, McCord journal boxes and lids, Patterson-Sargent paint, Pickering springs and Player truck.

## BRIDGE BUILDING.

ALTON, ILL.—The Alton & East Alton Ry. Co. will build a steel bridge over Wood River between Alton and East Alton. J. F. Porter, President.

ARDMORE, IND. T.—The Choctaw, Oklahoma & Gulf will build a 1,050-ft. trestle over the Santa Fe crossing.

ARKANSAS.—Last week, bills were introduced in the U. S. Senate and House of Representatives authorizing the Memphis, Helena & Louisiana Ry. to build railroad bridges across the Arkansas River and across White River, in the State of Arkansas.

BALLSTON SPA, N. Y.—The Union Bag & Paper Co., No. 1 Broadway, New York City, tells us that they are considering building a bridge across the Hudson River at their factory in Ballston Spa.

BAY CITY, TEXAS.—The county will issue \$40,000 of bonds for the proposed bridge over the Colorado River opposite Bay City. Jesse Matthews, County Judge.

BELLEFONTAINE, OHIO.—The City Council has been considering building a bridge across the railroad yard at High street.

BENTON HARBOR, MICH.—J. A. Corbett, Government Engineer in charge of river and harbor work in Michigan, has notified the city officers of Benton Harbor and the Highway Commissioners of Benton Township, to have the bridges crossing Paw Paw River changed to draw-bridges by April 1, 1902.

BIRDSBORO, PA.—The Reading Ry. is reported considering building a new bridge across the Schuylkill River at Birdsboro, on the line of the Wilmington & Northern. The company is also reported considering building a bridge over the Schuylkill River between Bridgeport and Norristown.

BLAIR STATION, PA.—A bill has been introduced in the House of Representatives authorizing the St. Clair Terminal R. R. Co. to build a bridge across the Monongahela River.

BUFFALO, N. Y.—The bids received Dec. 5 by the Board of Public Works at Albany for the bridge at Ferry street have been rejected. New bids will probably be wanted early in the new year.

Plans have been approved by the Grade Crossing Commission for a viaduct at Perry street to cost about \$120,000. It will be about 1,200 ft. long.

CAIRO, EGYPT.—Bids are wanted, until Jan. 3, for a lift bridge at Rayah Berhera Head location. The following quantities of material will be required: Mild steel, 12½ tons; cast-iron counterpoises, 7 tons; cast-iron, in columns, overhead girders, bearings, checker plates, etc., 13½ tons; steel chains, 750 lbs.; steel spindles, 600 lbs.; wrought-iron gas-pipe balustrade, 250 lbs.; wrought-iron bolts, etc., 600 lbs. The above quantities are approximate and are liable to alteration. Specifications of the Director of the Barrage, Cairo.

CANAJOHARIE, N. Y.—A drawbridge is proposed over the Erie Canal at this city, and the State Engineer has reported favorably on the proposition. A special appropriation will have to be made by the State before the work can be begun.

CHATTANOOGA, TENN.—Mayor A. M. Chambliss is considering with the Nashville, Chattanooga & St. Louis the question of building a bridge on Market street over the tracks of the railroad. Local report says that the entire length of the viaduct will be 1,400 ft. and the total cost \$100,000, the greater part of which will be paid by the railroad.

CLAY, W. VA.—Bids are wanted, until Jan. 20, by the Commissioners of Clay County, for a bridge over Elk River, near the mouth of Big Otter Creek. Plans may be seen at the County Auditor's office, or at the office of W. T. Hamrick, County Clerk.

CLEVELAND, OHIO.—The City Council has passed an ordinance to abolish the Union street grade crossings of the Erie and the Cleveland & Pittsburgh railroads at a cost of about \$125,000.

COHOES, N. Y.—City officers and the United Traction Co. are considering rebuilding the bridge at Ontario street. It is not decided if a new bridge will be built or the old structure repaired.

DALTON, MASS.—A bridge is proposed at the center to be used jointly as a highway and electric railroad bridge to cost \$15,000.

DAWSON, N. MEX.—In our issue of Oct. 18 we stated that the Dawson Ry. would let contracts about Jan. 1 for bridges. We are now told that the surveys are incomplete and the plans not finished, but that the bridges will be Pratt steel trusses, crossing both the Canadian and Red Rivers, in New Mexico. H. A. Summer, Chief Engineer, Alamogordo, N. Mex.

DECORAH, IOWA.—The time for receiving bids for building county bridges next year is on Jan. 9, not Jan. 1, as stated last week. F. A. Masters, County Auditor.

DENNISON, OHIO.—Tuscarawas County will build a concrete bridge over Little Stillwater River, at Center Street, but plans are not quite ready. The estimated cost is \$8,000.

DENVER, COLO.—Leslie M. Long, Engineer of the Department of Public Works, tells us that nothing has been done with the Lawrence street bridge, except the preliminary work for a plan and elevation. No appropriation is made, though the cost is estimated at \$40,000.

DULUTH, MINN.—Bids are wanted, until Jan. 7, by O. Halden, County Auditor, for a steel bridge of 130-ft. span over the St. Louis River between Byrne and Iron Junction on the Eveleth Roads.

EAST LONDON, SOUTH AFRICA.—It is reported that, as a result of a conference between representatives of the

Cape Government and the municipal and other local authorities at East London, South Africa, the basis of the proposed new bridge over the River Buffalo has now been roughly settled as follows: The bridge is to be of low-level pattern, with swing draw. It is intended to accommodate railroad, tramway and road and passenger traffic. The railroad level is proposed to be about 30 ft. above low water mark. Its cost will be \$500,000, approximately.

EL PASO, TEXAS.—On Dec. 19, a bill was introduced in the House of Representatives authorizing a free bridge across the Rio Grande between El Paso, Texas, and Juarez, Mexico.

EVERETT, WASH.—The County Commissioners are considering building a bridge across the Skykomish River at Sultan. Private subscriptions are offered toward the cost of the bridge, and it is probable that something can be done soon.

FALLOWFIELD, ONT.—A vote will soon be taken to spend \$10,000 for three iron bridges over the Jock River at this place.

FORT GIBSON, IND. T.—A bill authorizing the Ozark & Cherokee Central Ry. to build a railroad draw bridge across the Arkansas River, near Fort Gibson, was passed by the U. S. Senate on Dec. 18. A similar bill was introduced in the House of Representatives, on Dec. 10.

FREDERICTON, N. B.—The Department of Public Works is asking bids for rebuilding the North-West Miramichi bridge in Northumberland County. Plans at above department or at the office of Hon. Z. J. Tweedie, Premier.

GODERICH, ONT.—At a meeting of the County Council last week Mr. Ainsly, County Engineer, recommended a bridge over the Aux-Sable River at the boundary between the Counties of Huron and Middlesex, at \$1,500, and a Pratt truss bridge, 360 ft. long, on concrete piers and abutments on boundary between Colborne and Goderich townships, to cost \$9,000. He also advised that bids be asked immediately for rebuilding the Stanley bridge over the Bayfield River, near Clinton, to be 100 ft. long; also the bridge over the north branch of the Maitland River between Upper and Lower Wingham, to be 140 ft. long. Both these bridges to be steel on concrete abutments. The Road and Bridge Committee concurred in the report of the engineer, but decided to defer the question of building the Colborne and Goderich township bridge until later.

GREENFIELD, MASS.—The citizens of Greenfield and Deerfield and the Greenfield & Deerfield St. Ry. Co. are considering building a bridge across Deerfield River at a cost of about \$28,000.

GREENSBORO, GA.—Bids are wanted, Feb. 6, for the steel bridge over Oconee River. James L. Crossley, Clerk County Commissioners.

HAMILTON, ONT.—The Grand Trunk Ry. will build a bridge at Burlington Heights.

HENDERSON, N. C.—The overhead bridge, which the Seaboard Air Line contemplates building here, we are told, will be put in soon.

INDIANAPOLIS, IND.—It has been decided to repair the Washington street bridge over White River. A new bridge at this point is estimated to cost \$150,000, but it will not be built now.

LONDON, ONT.—The Middlesex County Council has decided to build two new bridges next year, one over the Thames River at Muncey site, and the other south of Strathburn, opposite the town line of Dunwich and Aldboro. An engineer will report as to the cost at the January meeting.

The City Council is petitioned to build a bridge at Wellington street to cost about \$35,000.

MANCHESTER, N. H.—The Boston & Maine will build a bridge over Webster street.

MANISTEE, MICH.—The Manistee & Northeastern R. R., we are told, is ready to receive bids for a bridge across the Narrows of Carp Lake. J. J. Hubbell, Chief Engineer.

MARLIN, TEXAS.—The International & Great Northern will build about 900 ft. of truss and girder bridges between Waco and Fort Smith, over various streams. The date for receiving bids is not set. Address the Chief Engineer.

MONTREAL, QUE.—Messrs. Madore & Guerin give notice that they will apply to the Parliament of Canada at its next session for the incorporation of the Montreal & St. Lawrence Bridge Co. to build a railroad and highway bridge across the St. Lawrence River from Montreal. This is the second company which is applying for a charter to build across the St. Lawrence from Montreal. The other company is the Montreal-Longueuil Bridge Co. Archer & Perron are the solicitors for the latter company.

NATAL.—Forms for the requisite bridge work for the branch lines of the Natal Government Railroads will, according to London advices, shortly be sent out.

NEWARK, N. J.—The Lackawanna R. R. is reported to have reached an agreement with the city authorities of Newark regarding the elevation of its tracks over the Passaic River to High street, and the depression of its roadway from that point west to the city line. This work involves a new steel bridge across the Passaic, and an ornamental bridge across Broad street and a new passenger station.

NEWTON, IOWA.—The County Board of Supervisors want bids, until Jan. 6, for building or repairing county bridges during 1902. J. Horn, County Auditor.

NEW WESTMINSTER, B. C.—The time for receiving bids for the combined highway and railroad bridge over Fraser River at this place has been extended to Jan. 25, as mentioned in our advertising columns.

NORFOLK, VA.—The Harbor Commissioners are considering giving a charter to the Norfolk, Portsmouth & Newport News Ry. Co., to build a drawbridge across the Western Branch for the proposed extension to Pig Point. The Commissioners are also considering a charter by an opposition company. W. D. Pender is interested in the Norfolk & Berkeley Ferry Co.

PARSONS, W. VA.—A bridge will be built across the Black Fork at Parson. It will be 470 ft. long and 21 ft. high.

PENDLETON, ORE.—The Washington & Columbia River Ry. will build a through pin-connected bridge over the Umatilla River near Pendleton, but the date for receiving bids is not decided upon, as the plans are not fully prepared. Joseph McCabe, General Manager, will receive the bids when the time is set. J. S. Cutler, Chief Engineer, Walla Walla.



**PORTAGE, MICH.**—A bridge will be built over the Sturgeon River this winter, for which the Township Board will receive bids at once.

**RALSTON, OKLA. T.**—A new bridge will be built across the Arkansas River.

**RICHMOND, VA.**—There is a bill before the Legislature to incorporate the Citizens Rapid Transit Co., which contemplates building a viaduct from College street to Church Hill.

**ROCK CAMP, W. VA.**—The Pennsboro & Harrisville, Ritchie County Ry. will open bids, on Jan. 15, for a steel bridge over Hughes River. M. K. Duty, President, Pennsboro, W. Va.

**RUMFORD FALLS, ME.**—A steel bridge will be built over Swift River, between the towns of Rumford Falls and Mexico, Me. It will be 165 ft. long, and H. C. Danton, of Rumford Falls, will receive the bids when the time is set.

**ST. PAUL, MINN.**—The amount set aside in the city budget for new bridges for the next 12 months is \$433,000. The two most important structures are the Arcade street bridge over the Omaha tracks, and an extension to the Third street structure. The Bridge Department contemplates remodeling a number of bridges next year.

**SANTA FE, N. MEX.**—It is understood that the Santa Fe Central R. R. will build a bridge across the Santa Fe and the Denver & Rio Grande tracks at the foot of San Francisco street.

**STERLING, KAN.**—The question of building a new bridge across the Arkansas River west of Sterling will come up before the County Commissioners at the April meeting.

**STOCKTON, CAL.**—Bids are wanted, Jan. 7, by the County Supervisors for the bridge across the Mokelumne River, near Lockeford. The county has another bridge under consideration. (Nov. 1, p. 762.)

**SYDNEY, CAPE BRETON, N. S.**—Engineers under the direction of Hiram Donkin, are making surveys for the proposed cantilever bridge across the Strait of Canso.

**TACOMA, WASH.**—The Committee on Harbor & Water Front is considering building a bridge across the tide flats at Twenty-first street.

**WATERLOO, IOWA.**—City Engineer Newton is ordered to make plans for a steel girder bridge across the Cedar River at Fourth street, to replace the present structure. (Nov. 29, p. 831.)

**WELLSBURG, OHIO.**—The American Bridge Co. is reported to have the contract for the large cantilever bridge over the Ohio River near this place, for the Pittsburgh, Carnegie & Western R. R.

**WICHITA, KAN.**—A viaduct is proposed on First street over the tracks of the three railroads which occupy as many streets. H. J. Harding, City Engineer, says that no plans have been adopted. It will be about 1,400 ft. long.

**WINCHESTER, ONT.**—A vote will be taken, Jan. 6, to raise \$5,100 for a steel bridge over the Nation River. Particulars from George Quart, Township Clerk.

**WINSLOW, ME.**—An election was held, Dec. 26, to consider building a new bridge over the Sebasticook River at a probable cost of \$15,000.

#### Other Structures.

**ANNISTON, ALA.**—The Woodstock Iron Co. will rebuild and enlarge its furnace.

**ASHLAND, KY.**—The Ashland Coal & Iron Co. is planning extensive improvements and enlargements. The plan includes a new steel mill. Amended articles of incorporation were filed in Kentucky, Dec. 19, increasing the capital stock from \$600,000 to \$3,000,000.

**CINCINNATI, OHIO.**—The Cincinnati, Hamilton & Dayton has decided to build a new station in Cincinnati.

**CONSHOHOCKEN, PA.**—The Alan Wood, Iron & Steel Co. has decided to install a combination universal plate and blooming mill, with a daily capacity of 500 tons. The contract for the engines is let to Mesta Machine Co., Pittsburgh. An open-hearth plant of five 50-ton furnaces will also be built. Julian Kennedy, of Pittsburgh, is the designing engineer.

**HENDERSON, N. C.**—The Seaboard Air Line Ry. will build a new passenger station at Henderson within a short time.

**HOUSTON, TEXAS.**—The Southern Pacific is reported about to spend \$65,000 in enlarging its shops at Houston. The contemplated improvements include several large buildings and new machinery.

Bids are wanted by John W. Maxcy, Houston, until noon on Jan. 2, for the construction of pile foundations, bulk head, flumes, bridges, concrete and brick masonry work for one or more power houses at a point about seven miles northwest from Crosby, Harris County, Texas.

**LOS ANGELES, CAL.**—The Southern Pacific has decided to build shops in Los Angeles, and has bought land for that purpose.

**NAVARRA, OHIO.**—We are told that there is no truth in the report that the Wheeling & Lake Erie will build machine shops at this place.

**NEWARK, N. J.**—See Bridge Building.

**PHILADELPHIA, PA.**—Local reports say that the Pennsylvania R. R. will, during the coming year, build several new passenger stations and enlarge others, the most important points being Bon Venue, East Liberty, Wilkinsburg and Braddock. It is also stated that Greensburg will get a new station.

The Baldwin Locomotive Works has been granted permission by the Councils to occupy certain streets between their shop buildings in lieu of damages to which the company is entitled from the city.

**PHILLIPSBURG, N. J.**—Joseph Wharton, of Philadelphia, has decided to rebuild the Andover Furnace at this place. S. B. Patterson will be Superintendent.

**PITTSBURGH, PA.**—The Dubuque Malleable Iron Co. was incorporated in Pennsylvania with a capital of \$175,000. E. J. Fraenheim, C. A. Fagan, W. A. Magee and others are the incorporators. The site for the plant is not determined upon.

**PORTLAND, ORE.**—The Phoenix Iron Works, which was incorporated last week by Samuel Morrow, M. G. Wolf and Louis Steinhauser, has leased a part of the plant of the Wolf & Zwicker Works. The officers are: President, Samuel Morrow; Vice-President, C. H. Fuchs; Secretary and Treasurer, Louis Steinhauser; Superintendent and

Manager, Fritz Wolff. The company will make all kinds of machinery, jail work, vaults and tanks; cast iron, sill and brass castings; mining and logging engines.

**SHARON, OHIO.**—The National Steel Foundry Co., recently incorporated with \$250,000 capital, will build its plant in Sharon, Ohio. It will have two buildings, each 500 ft. long and 63 ft. wide. C. G. Robinson, formerly of the Pennsylvania Steel Co., will be manager.

**SYDNEY, CAPE BRETON, N. S.**—The Intercolonial Ry. will build an electric power plant at Sydney.

**WESTFIELD, N. J.**—A large power house will soon be built by the Elizabeth, Plainfield & Central New Jersey Ry. Co. at Westfield. Col. E. W. Hine, Lawyers' Bldg., Newark, is Secretary of the company.

**WILMINGTON, DEL.**—The Chief Engineer of the Pennsylvania Railroad will soon send out plans for a new station at Wilmington, Del., and one for Bristol, Pa.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

##### Central Association of Railway Officers.

The officers for next year are: President, C. A. Paquette, of the Big Four; Vice-President, C. L. Nicols, of the Rock Island, and Secretary, A. J. Elliott, of Peoria, Ill.

##### Southern & Southwestern Railway Club.

At the November meeting of this Club the following officers were elected: President, J. H. Watters, Master Mechanic, Georgia Railroad; First Vice-President, Julian R. Lane, General Manager, Macon & Birmingham; Second Vice-President, L. B. Rhodes, Master Mechanic, Georgia Southern & Florida; Secretary, W. A. Love, Southern Iron & Equipment Co., Atlanta, Ga.; Treasurer, E. C. Spalding, Vice-President Atlanta, Knoxville & Northern.

##### The Railway Transportation Association.

The winter meeting of the Railway Transportation Association will be held at the Great Northern Hotel, Chicago, 10 a.m., Wednesday, Jan. 15. Reports of committees on the following subjects will be considered: General Transportation Topics; Car Service; Interchange and Distribution; Tonnage Rating of Engines; Loading Freight Cars to Their Full Capacity; Clearances and Dimensions. A cordial invitation is extended to railroad officers interested in transportation subjects to be present at this meeting.

##### American Economic Association.

This Association will hold its annual meeting at Washington, D. C., Dec. 27-30. The sessions will be held at the Columbian University, and the meetings of Friday and Monday evenings will be held jointly with the American Historical Association. Among the papers to be presented are: "Industrial Liberty," by Richard T. Ely, President of the American Economic Association; "An Undeveloped Function," by Charles Francis Adams, President of the American Historical Association; "The Meaning of the Recent Expansion of the Foreign Trade of the United States," by Brooks Adams, of Quincy, Mass.; "Commercial Policy of Europe," by Worthington C. Ford, of the Boston Public Library; "The Position of the Workman in the Light of Economic Progress," by Prof. Charles A. Tuttle, of Wabash College, Ind.; "Conciliation and Arbitration Among Miners," by Herman Justi, Commissioner Illinois Coal Operators' Association, with a discussion led by Carroll D. Wright, U. S. Commissioner of Labor.

##### Engineers' Club of St. Louis.

The five hundred and thirty-fourth meeting was held Dec. 4, Vice-President Kinealy presiding. Attendance, 31 members. A letter was read from the St. Louis Railway Club, inviting the members of the Engineers' Club to attend, on Friday, Dec. 13, 1901, at the Southern Hotel, both their afternoon meeting and annual Christmas tree smoker, which is to be held in the evening. Motion carried to accept the invitation. The report of the Committee on Prizes was read. The chair announced that the recommendations of the committee had been approved by the Executive Committee at their meeting of Nov. 6, and in accordance with their recommendations he was pleased to award the prize to Mr. J. S. Branne for his paper entitled "The Steel Skeleton Construction of a Tall Office Building," which was read before the club at the meeting held Nov. 7, 1900.

The Nominating Committee made its report on nominations for officers for the ensuing year, as follows:

For President, J. M. Kinealy, F. B. Maltby.  
For Vice-President, E. A. Hermann, J. L. Van Ornum.  
For Secretary, D. W. Roper, A. H. Zeller.  
For Treasurer, George I. Bouton, N. W. Perkins, Jr.  
For Librarian, E. B. Fay, W. H. Henby.  
For Directors, Carl Gayler, A. L. Johnson, E. J. Spencer, Wm. Wise.

For Members Board of Managers of Engineering Societies, E. R. Fish, J. A. Laird, W. A. Layman, P. N. Moore.

Additional nominations were made as follows:

For President, E. A. Hermann.  
For Vice-President, A. H. Blaisdell.  
For Secretary, W. H. Bryan.  
For Librarian, Walter Brown.  
For Directors, W. A. Layman, H. L. Reber.  
For Members Board of Managers, E. E. Wall, E. B. Fay.

The five hundred and thirty-fifth meeting (the annual dinner of the Club) was held Dec. 18, President Spencer presiding. There were 37 members and five guests present. After dinner had been served the Club was called to order and announcement made of the Executive Committee's report of the letter ballot for officers for the ensuing year, with the following result:

President, J. H. Kinealy.  
Treasurer, George I. Bouton.  
Librarian, Edw. B. Fay.  
Member Board of Managers, F. R. Fish.

Vice-President, Secretary, two Directors and one member of Board of Managers there was no election, none of the candidates having received a majority of the votes cast. As the newly-elected President, Mr. Kinealy, was not present, Mr. Spencer retained the chair and ruled it in order to fill the above-mentioned vacancies.

After the ballots were taken the following results were announced:

Vice-President, J. L. Van Ornum.  
Secretary, D. W. Roper.  
Directors, A. L. Johnson and E. J. Spencer.  
Member Board of Managers, J. A. Laird.

#### PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. S. E. Moore, for many years Auditor of the Carnegie Steel Company, has been appointed Auditor of the Pressed Steel Car Company.

—Mr. George Sealy, Second Vice-President of the Gulf, Colorado & Santa Fe Railway, died suddenly Dec. 14, while en route to New York. He was born at Wyoming Valley, Luzerne County, Pa., Jan. 9, 1835.

—The new Division Superintendent of the Cumberland Division of the Baltimore & Ohio, Mr. C. W. Galloway, was born Dec. 11, 1868, entered railroad service in 1883 as a messenger for this company and passed through various grades, serving as clerk, stenographer and secretary to the General Superintendent, until 1897, when he was appointed trainmaster of the Baltimore Division, in which position he remained until 1899. He then became Assistant Superintendent of the First Division of the main line, from which position he was promoted to that of Superintendent of the Cumberland Division.

—Mr. James McNaught, First Vice-President of the Great Northern Railway of Canada, is a graduate of Wesleyan University. His railroad career dates from 1871, when he began as a Director and Counsel for the Columbia & Puget Sound. For eight years he was division counsel for the Northern Pacific, with jurisdiction over Washington and Idaho. Then for two years was General Solicitor at St. Paul, and in 1889 became General Counsel. Mr. McNaught held a similar position for the Receivers from 1893 to 1895, later becoming Second Vice-President of the Great Northern Railway of Canada, and finally First Vice-President.

—Mr. Frank K. Huger, who, on the 1st of December, became Superintendent of the Second Division of the Seaboard Air Line at Raleigh, N. C., is 56 years old. He was born at Clydesdale, Beaufort District, S. C. Mr. Huger's railroad service began in 1866. For four years, 1874-1878, he was agent for the South Carolina, then General Freight Agent of the Greenville & Columbia, later becoming Master of Transportation of the East Tennessee, Virginia & Georgia, then Division Superintendent of the Fourth Division of the Southern, from which position he resigned Jan. 1, 1900. He assumed his new duties Dec. 1, 1901.

—Mr. John J. Valentine, President of the Wells, Fargo & Company's Express, died at Oakland, Cal., Dec. 21. Mr. Valentine was born at Bowling Green, Ky., 61 years ago. After receiving a common school education he began his business career in 1854. Shortly after the Adams Express Company obtained express facilities in Bowling Green, and Mr. Valentine became identified with them, remaining with them until 1861, when he went to California as joint agent for the Wells-Fargo & Company's Express and the Pioneer Stage Company. Subsequently he became Superintendent of the latter company, then Superintendent of the Pacific Division of Wells-Fargo & Company's Express, and in 1869 he came to New York as General Superintendent. He had since filled the offices of Director, Vice-President, and General Manager.

—Mr. B. C. Milner, Jr., recently appointed Engineer of Maintenance of Way of the St. Louis-Louisville Lines of the Southern Railway, was born Nov. 13, 1860, in Pike County, Ga. Mr. Milner was educated at the University of Georgia and two weeks after leaving school, which was in 1882, he became rodman on the Louisville, New Orleans & Texas, now known as the Yazoo & Mississippi Valley. For one year (1885-1886) he was Resident Engineer on the Covington & Macon, and in the last-named year became Principal Assistant Engineer. He then went with the Georgia Southern & Florida as Assistant Engineer, finally becoming Chief Engineer. In 1895 he was appointed Assistant Engineer of the Southern, and four years later Resident Engineer of the Western Division. In April, 1901, Mr. Milner was transferred to St. Louis as Resident Engineer in charge of construction, and on Dec. 1 was made Engineer of Maintenance of Way.

#### ELECTIONS AND APPOINTMENTS.

**Baltimore & Ohio.**—The following changes have been announced, effective Jan. 1: For operating purposes the Pittsburgh & Western; the Pittsburgh, Cleveland & Toledo; the Pittsburgh, Painesville & Fairport; the Pittsburgh Junction; the Cleveland, Lorain & Wheeling; the Cleveland Terminal & Valley; and the Ohio & Little Kanawha lines will be merged into the B. & O. The jurisdiction of General Superintendent W. R. Woodford is extended over the New Castle and Cleveland Divisions. Robert Finney, General Superintendent of the Pittsburgh & Western, will become General Agent in Allegheny, Pa. The division engineers have been placed under the direct charge of the superintendents and a division engineer has been appointed for each division. D. Lee, heretofore Superintendent Maintenance of Way, becomes Consulting Engineer, with headquarters at Zanesville, Ohio. M. L. Byers, formerly with the American Bridge Company, becomes Engineer of Maintenance of Way. The division engineers will be assigned later.

**Central Vermont.**—J. Alex. Hutchison has been appointed Chief Surgeon, with headquarters at St. Albans, Vt.

**Chicago, Burlington & Quincy.**—H. S. Storrs, Division Superintendent at Creston, La., has resigned. (See Wheeling & Lake Erie.) E. W. Farnham, Superintendent of Car and Special Freight Service, with headquarters at Chicago, Ill., has resigned.

**Delaware Valley.**—T. A. Allen, Chief Engineer, has resigned.

**Denver & Rio Grande.**—J. L. Gogerty has been appointed Superintendent of Terminals.

**Detroit Southern.**—J. W. Sherwood has been appointed Superintendent of the Northern Division, succeeding J. R. Hawkins, resigned, effective Dec. 20.

**Houston & Texas Central.**—H. C. Reese, heretofore Assistant General Freight Agent, has been transferred to a similar position at Dallas, Texas, succeeding R. D. Berrey, resigned. Mr. Reese, in turn, is succeeded by J. R. Christian, with headquarters at Houston.

**Kansas City Southern.**—L. S. Robertson has been appointed Division Superintendent.

**Kansas Southwestern.**—D. H. Nichols, heretofore Vice-President and General Manager of the Pecos System, has been appointed General Manager of the K., S. W.

**Louisville & Nashville.**—H. Swoyer has been appointed General Master Mechanic, with headquarters at Louisville, Ky.



**Missouri Pacific.**—F. J. McLean has been appointed Assistant to General Manager.

**Mobile & Ohio.**—George S. McKee, heretofore Division Master Mechanic of the Wabash, has been appointed Superintendent of Motive Power and Car Equipment of the M. & O., succeeding M. T. Carson, resigned on account of ill health.

**Pecos System.**—Avery Turner, heretofore Division Superintendent of the Atchison, Topeka & Santa Fe, has been appointed General Manager of the P. S., with headquarters at Amarillo, Texas.

**Pennsylvania Company.**—According to newspaper reports, the Board of Directors, which will meet on Dec. 27, in Philadelphia, will elect J. J. Brooks Second Vice-President to succeed his brother, the late J. T. Brooks.

**St. Louis Southwestern.**—R. C. Fyfe has been appointed Assistant General Freight Agent, with headquarters at Tyler, Texas.

**Tehuantepec National.**—The officers of this company are as follows: Sir Weetman D. Pearson, Concessionaire, London, England; J. B. Body, Director, Mexico City; Frederick Adams, General Manager; E. C. Buchanan, Comptroller; J. H. Feehan, Traffic Superintendent; C. W. Carnegie, Auditor, and H. Hoyer, Material Agent, all with headquarters at Coatzacoalcas, Mexico.

**Wabash.**—George S. McKee, Division Master Mechanic, with headquarters at Fort Wayne, Ind., has resigned. (See Mobile & Ohio.)

**Wheeling & Lake Erie.**—H. S. Storrs, heretofore Division Superintendent of the Chicago, Burlington & Quincy, has been appointed General Superintendent of the W. & L. E.

## RAILROAD CONSTRUCTION.

### New Incorporations, Surveys, Etc.

**ALABAMA ROADS.**—Surveys are reported in the vicinity of Selma, Ala., running in a northerly direction, with a view of reaching valuable coal fields in Tuscaloosa and adjoining counties. F. F. Whittekin is making examination of the proposed route.

**CAPE GIRARDEAU & NORTHERN.**—An officer writes that three engineer parties are locating this line in Missouri from Cape Girardeau, via St. Mary's and St. Genevieve, on the west bank of the Mississippi River, to Crystal City, Mo., about 95 miles distant. Contracts for grading, track laying, etc., have been let to B. S. Johnston. The character of the work to be done is of medium difficulty, with maximum grades of 10 ft. to the mile, and maximum curvature of 4 deg. Seventy-five-lb. rails have been ordered from the Cambria Steel Co., with fastenings from the Carnegie Steel Co. (Dec. 13, p. 868.)

**CENTRAL NEW ENGLAND.**—This company has begun operating its Springfield line, which is now entirely completed except for the short loop around the Montague farm, which was the cause of litigation with the New York, New Haven & Hartford. The latter company has now ceased to oppose the project and the line will be completed in a short time.

**CENTRAL VALLEY.**—Incorporation has been made of a line to be built between New Philadelphia, Ohio, and New Cumberland, W. Va., 19 miles.

**CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.**—Contract for the Cumberland, Chippewa Valley & Northwestern branch of this company is reported let to Winston Bros., of St. Paul. This branch line was incorporated in Wisconsin last April to build a connection between Rice Lake, on the C., St. P., M. & O., to a point on the Chicago & North Western in Iron County, about 100 miles northeast.

**CHOCTAW TRACTION.**—Franchise has been granted in Indian Territory for an electric line between South McAlester, Carbon and Haileyville, taking in a number of intermediate towns. The total length of the line is to be about 40 miles, and it is designed to connect South McAlester with all the mining towns in that vicinity.

**DALLAS & NEW MEXICO.**—This company, reported Dec. 13, p. 868, as having secured 60 miles of graded line between Letot and Boyd, Texas, with additional franchises, was incorporated at Dallas, Jan. 4, 1900, and has a capital stock of \$500,000. Its original incorporation provided for a line northwest from Dallas through the counties of Tarrant, Wise, Young, Haskell, King, Crosby, etc., to a point on the western limits of the State in Cochran or Bailey county. The incorporators were H. M. Skelton, Kirk Hall and others, of Dallas.

**DAYTON & KENTON (ELECTRIC).**—Articles of incorporation were filed at Columbus, Ohio, Dec. 10, for an electric line from Dayton to Kenton, Ohio, and also to Springfield and Troy. It is the plan of the incorporators to build a double track between Dayton and New Carlisle, then a single track to Springfield, 11 miles, and a single track eight miles west to Troy. The main line will connect at Kenton with the lines of the Everett-Moore Syndicate, forming a part of a through trunk line from Toledo. It is reported that the bonds have been sold and that work is to be begun at once by the Falk Company, of Milwaukee. Entrance into Springfield will be affected over the tracks of the American Ry. Co.

**GEORGIA NORTHERN.**—It is reported that contracts are to be let at once for completion of the work on this company's extension between Carlisle and Albany, Ga., 18 miles, on which grading is said to be completed. The office of the company is at Moultrie, Ga.

**GEORGIA SOUTHERN & FLORIDA.**—An officer writes that press reports stating that an extension is to be built from Valdosta, Ga., to Pensacola, Fla., are erroneous, as no such work is contemplated.

**GRAND TRUNK OF CANADA.**—An officer writes in regard to the proposed Burk's Falls line which was to afford a connection with the Northern Pacific Junction Division of the Grand Trunk, and has been extensively commented on in the press, that the line is merely a spur 1¼ miles long to connect with some industrial establishments.

**INDIANA ROADS (ELECTRIC).**—A company composed of citizens of North Manchester, Ind., was granted, on Dec. 5, franchise for electric lines from Manchester to the Kosciusko County line, and from Wabash south to the Grant County line, a total of 26 miles. Work must be begun within two years by the terms of the franchise.

**KANSAS CITY, HOT SPRINGS & SOUTHWESTERN.**—This company has filed articles of incorporation in Arkansas, with a capital stock of \$1,250,000, and proposes to build a railroad from a point in Scott County, Ark., at or

near Waldron, through Montgomery and Garland counties, to Hot Springs, a total distance of 82 miles. The President of the company is C. C. Godman, of Fort Smith, who is now engaged on the Arkansas Western.

**KANSAS CITY SOUTHERN.**—A new five-mile spur is reported built by this company to asphalt deposits at Port Neches, Tenn.

**KENTUCKY ROADS.**—An officer writes that the coal road 4½ miles long, reported in our Construction Supplement as having been built by the North Jellico Coal Co., has been built and turned over to the Louisville & Nashville. (Construction Supplement, Oct. 11, 1901.)

**KENTWOOD & EASTERN.**—An officer writes that 16 miles of track has been laid on this new line in Louisiana during the present year between Mount Hermon and Hackley. The line is also projected from Hackley to Balltown, 20 miles further. The total length of the original Kentwood & Eastern is 31 miles. (Nov. 1, p. 764.)

**LAKE SHORE TRACTION.**—Incorporation of an electric line, with a capital of \$280,000, to run between Westfield and Silver Creek, Chautauqua County, has been made in New York State. The proposed distance is 28 miles and the directors are A. C. Wade, A. N. Broadhead and F. R. Green, of Chautauqua, N. Y.

**LONG ISLAND.**—In view of the new plan of the Pennsylvania to tunnel the North River for entrance into New York, the Long Island Extension has withdrawn the application made some time ago to the Rapid Transit Commission for permission to tunnel the East River at Thirty-third street. It is considered advisable to have the two projects under the same corporate management.

**MANISTEE & NORTHEASTERN.**—An officer writes that surveys have been completed from Solon, Mich., to within five miles of Northport, a distance of 25 miles. Rails have been laid upon four miles of this extension and three miles additional graded. The company is now ready to receive bids for the proposed bridge across the narrows of Carp Lake. (See under Michigan Roads, Dec. 13, p. 868.)

**MARQUETTE & SOUTHEASTERN.**—An officer writes that this line in Michigan is under contract to McDowell Bros. & Co., of Marquette, between Presque Isle and Lawson, 27 miles, and that building between these points is now in progress. No track has been laid on the line as yet.

**MEXICAN INTERNATIONAL.**—An officer writes that no track has been laid on the extension of this company during the past year, but work is now in progress on the new line between Santiago Papasquiaro and Guanacavi, 89 miles. The contractor is W. T. Robertson, of Durango.

**NEW ORLEANS & MISSISSIPPI MIDLAND.**—This company was incorporated, Dec. 7, by proclamation of the Governor of Mississippi. It is the intention of the incorporators to build from a point on the southern boundary of the State north towards Memphis, Tenn. Preliminary surveys are now being made at Pontotoc by George L. Davis, Chief Engineer.

**NORTH CAROLINA ROADS.**—Contract for a steam railroad 30 miles long between Washington and Newbern, N. C., is reported let by Wm. Marvin, to provide transportation for timber from his extensive holdings in that locality.

**OREGON & SOUTHEASTERN.**—This company has been incorporated at Portland, Ore., to operate mines and build railroads. The capital stock is \$1,000,000, and the President is Joseph C. Ward, of Portland.

**PARAGOULD SOUTHEASTERN.**—The Secretary of State of Arkansas has given this company an amended charter. The line is now in operation between Paragould, Ark., and Hornersville, Mo., and the revised charter permits of extension southeast 15 miles from Hornersville to Blytheville, on the proposed extension of the St. Louis, Kansas & Southern between Caruthersville, Mo., and Osceola, Ark.

**PENNSYLVANIA.**—Contract for the change of line at Eddystone, Pa., on the Philadelphia, Wilmington & Baltimore, has been let to Gonder & Brownback, of Strasburg, Lancaster County, Pa. The work includes excavations amounting to 250,000 yds., and bridge masonry to the extent of 10,000 yds. (Official.)

Contracts were let, Dec. 10, to H. S. Kerbaugh, of Philadelphia, for building the proposed four-track stone arch bridge at New Brunswick, and to B. F. Brendlinger, of Philadelphia, for the new Gallitzin tunnel in the Alleghenies, which is to be 3,600 ft. long and located about 80 ft. from the present tunnel.

**SHORT LINE AND SAN PEDRO.**—The agreement between the Oregon Short Line and the San Pedro, Los Angeles & Salt Lake, in regard to their lines through Meadow Valley Wash, Nev., does not, as commonly supposed, involve a single track.

There will be two roadbeds side by side, and it is thought by the engineers that at no point in the canyon will the tracks be nearer each other than 20 ft., and that they will not cross at any point. As soon as the courts decide which company is entitled to the original right of way, the company which wins the suit will be given the right of way for 100 ft. on either side of the track, and as that is more than one or two tracks would require, the losing company will receive a franchise to build on the same right of way, but not near enough to interfere with the original company's track or trains. So far, the new lines are being run on the opposite side of the wash and there seems to be no likelihood of the two coming together. The old survey of the San Pedro was merely a resurvey of the Short Line's alignment, and it would have been impossible to build both lines, as they were laid out, to all intents and purposes, practically alike. The accompanying cut gives a general view of the work in this territory.

**PEOPLES TRAMWAY (WORCESTER).**—This electric line is to be opened on Christmas Day and will give a through connection more than 35 miles long between Danielson-

ville, Conn., and Worcester, Mass., paralleling the Norwich & Worcester Division of the New York, New Haven & Hartford. It is understood that it is controlled by the latter company for the purpose of regulating competition.

**SANTA FE CENTRAL.**—This company, on Dec. 5, filed plans for its permanent survey for 83½ miles of the projected line from Cameleon Hill, N. Mex., to a point near Gallistoe. The new line is to run for 30 miles across unsurveyed Government land, and for the greater part of its distance over unappropriated public land. (Construction Supplement, Oct. 11, 1901.)

**SOUTHERN MISSOURI.**—An officer writes that this line is now under contract for its entire length to McArthur Bros., of Chicago. It is projected between Ste. Genevieve and Bismarck, Mo., 43 miles. Surveys have been completed and a considerable portion of the line is graded. (Construction Supplement, Oct. 11, 1901.)

**SOUTHERN PACIFIC.**—It is reported that the new branch line in Louisiana between Abbeville and Gueydan, 24 miles, is half finished and will be ready for operation within the next two months. This branch is to form a new line by means of other connections through the central part of Louisiana from New Iberia, about 80 miles long. (Construction Supplement, Oct. 11, 1901.)

**TACOMA EASTERN.**—An officer writes that 17 miles of track have been laid on this new line during 1901 between Johnson's and Kapousen, Wash. Work is now in progress from Kapousen to Ashfords, 32 miles beyond. (Construction Supplement, Oct. 11, 1901.)

**TEXAS & NEW ORLEANS (SOUTHERN PACIFIC).**—An officer writes that the proposed extension from the Neches River to Jacksonville, Texas, is now under contract to Tansy & Garrison, of Jacksonville, Texas, from a point 31 miles from Athens, Texas, where the road now ends, to Jacksonville, a distance of 12 miles. Surveys have also been made 42 miles beyond, as far as Mahl.

**TRINITY VALLEY & SOUTHERN.**—The charter of this company was filed in the office of the Secretary of State at Austin, Texas, Dec. 13. The company has a capital stock of \$20,000, and its purpose is to build from Dodge, Walker County, Texas, to Cold Springs, San Jacinto County, 20 miles. The general offices are located at Oakhurst in San Jacinto County, and the incorporators are: J. T. Pinkley, D. R. Baker, G. A. Winn and others, of Oakhurst, Tex. A line known as the Trinity Valley was built seven miles between Dodge and Oakhurst in 1899 and 1900, when work was suspended, and it is probable that this company will use the old work so far as it has been done. (Construction Supplement, Oct. 11, 1901.)

**WASHINGTON & ANNAPOLIS (ELECTRIC).**—It is expected that work will be begun early next year on this proposed line from Washington, D. C., which is to make rapid transit connections with Baltimore, Annapolis and Laurel, Md. The same company, under the name of the Berwyn & Laurel Electric, expects to complete in about three months a double track line between Berwyn and Laurel, nine miles, and traffic arrangements have been made with the Washington Traction Co. for entrance into Washington. The length of the line between Washington and Baltimore will be 31 miles, double track.

**WHITE RIVER.**—Contracts are reported let for 60 miles additional of this proposed line in Arkansas, which was projected from Batesville, about 150 miles north to a point on the State line south of Springfield, Mo. The new contract awarded to Collier & Williamson and W. H. Denison for clearing the right of way, brings the work as far as Buffalo City.

**WICHITA VALLEY.**—It is reported that this company will extend its lines from Holiday, Texas, to Geraldine, Archer County, seven miles distant. Morgan Jones, Wichita Falls, President.

## GENERAL RAILROAD NEWS.

**ATLANTA, KNOXVILLE & NORTHERN.**—This company has been authorized to make a consolidated mortgage with the United States Trust Co., trustee, to issue bonds on its line at the rate of \$10,000 a mile. \$1,000,000 of this issue is to be reserved to cancel the outstanding first mortgage 5 per cent. bonds, and \$1,280,000 will be applied to the requirements of the company.

**BOSTON & ALBANY.**—This company has petitioned the Massachusetts Railroad Commissioners for authority to issue \$3,858,000 bonds to take up maturing obligations. It is said that an order approving the bond issue will be signed immediately.

**CALIFORNIA & NEVADA.**—The United States Circuit Court at Oakland, Cal., has ordered the sale of this road under foreclosure of mortgage. The California & Nevada extends between Oakland, Cal., and Bryants, 22 miles, and is 3-ft. gage. A receiver was appointed in May, 1896, in a suit to foreclose \$500,000 of bonds.

**FLORIDA GRAND TRUNK.**—It is said that this company bought, on Dec. 14, the property of the Tallahassee Southeastern. The Tallahassee Southeastern was chartered in Florida in 1893, with a capital of \$500,000, to build from some point on the Atlantic ocean through Tallahassee to some point on the boundary line between Alabama and Florida. A premium of 10,000 acres of land per mile was granted the company.

**INTERNATIONAL & GREAT NORTHERN.**—Application to register a bond issue of \$360,000 on 18 miles of completed road of the Fort Worth Division, has been filed with the Railroad Commission of Texas. The company also desires to register \$240,000 bonds on another part of the line now completed.

**MISSOURI, KANSAS & TEXAS.**—The Railroad Commissioners of Texas, on Dec. 8, approved a contract between this company and the Denison, Bonham & New Orleans, in accordance with which the latter is to be operated by the Missouri, Kansas & Texas for 10 years.

**ST. JOSEPH & GRAND ISLAND.**—The voting trust, under which the Central Trust Co., of New York, has issued certificates of deposit on behalf of the trustees of this company's stock, terminates on Jan. 1, 1902, and the Central Trust Co. advertises that regular certificates of stock of the St. Joseph & Grand Island will be issued after that date on surrender of certificates of deposit.

**WESTERN MARYLAND.**—Proposals are asked for the purchase, in whole or in part, of \$1,000,000 registered stock of the city of Baltimore, known as the Western Maryland R. R. 1952 refunding loan, interest to commence Jan. 1, 1902, and the stock will be delivered the following day. The city does not tax its own issues of stock and will pay the tax imposed on this issue by the State of Maryland, in place of the holders thereof.



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